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Perceived Competence and Autonomy as Moderators

of the Effects of Achievement Goal Orientations

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Perceived Competence and Autonomy as Moderators

of the Effects of Achievement Goal Orientations

by

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To My Parents and Father-In-Law

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Perceived Competence and Autonomy as Moderators

of the Effects of Achievement Goal Orientations

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The primary purpose of the study was to investigate whether two psychological characteristics, perceived competence and perceived autonomy, play roles as moderators in the relationship between achievement-goal orientations and a broad range of learning- and achievement-related variables. Compared to a mastery goal and a performance-avoidance goal, a performance-approach goal orientation has generated the most disagreement among researchers about its nature and effects. This study, therefore, examined perceived competence and perceived autonomy as moderators not only to understand better the effects of the performance-approach goal, but also to obtain evidence corroborating the positive relationship of a mastery goal and the negative relationship of a performance-avoidance goal with learning outcome measures.

The participants in this study were 164 college students enrolled in a statistics course at a large university in the Southwest United States. The participants responded to measures of achievement goal orientations, perceived competence, perceived autonomy, adaptive learning strategy use, interest, and effort. Consistent with

previous findings, the results from a series of analyses of variance in this study indicated that perceived competence and perceived autonomy play roles as moderators on the relationship of a mastery goal with certain outcome measures. Specifically, perceived competence increased the magnitude of the positive relationship between a mastery goal and adaptive learning strategy use, and perceived autonomy enhanced the magnitude of the positive relationship between a mastery goal and effort. However, no moderating effect was found for the relationship between either a performance-approach goal or a performance-avoidance goal and learning-related outcomes. Consequently, the moderating role of perceived competence or perceived autonomy did not serve to clarify the relationship of performance goals with learning outcome measures. In addition, perceived competence played a significant role in determining the most beneficial type of multiple-goal pursuit in relation to increasing academic performance. For students who were high in perceived competence, the adoption of both a mastery goal and a performance-approach goal resulted in the highest level of achievement. On the other hand, for students low in perceived competence, the pursuit of a performance-approach goal alone led to the highest scores on achievement. Therefore, the effectiveness of the combination of a mastery goal and a performance-approach goal was evident only when the students who adopted the goals perceived themselves as competent. However, neither perceived competence nor perceived autonomy had critical roles in determining the optimal type of multiple-goal pursuit in relation to promoting other outcome measures (adaptive learning strategy use, interest, and effort).

TABLE OF CONTENTS

List of Tables

List of Figures

CHAPTER 1

INTRODUCTION

Over the past decade, researchers in achievement motivation have given much attention to the theory of achievement-goal orientation (Elliot, 1997). The reason for this interest is that this theory provides important insights into cognitive, affective, and behavioral learning outcomes (Bandura & Dweck, 1985; Kaplan & Midgley, 1997).

Achievement-goal orientation is defined as the set of purposes or reasons a learner may have for performing an academic task (Ames, 1992; Dweck, 1986; Nicholls, 1989; Pintrich, 2000). Classical achievement-goal theory discussed two types of achievement goals, mastery and performance goals. Both types of goals concern the pursuit of competence in achievement-related settings, but students with the two goal orientations differ in the ways they define and pursue competence (Elliot & McGregor, 2001; Harackiewicz, Barron, Tauer, Carter, & Elliot, 2000; Pintrich, 2000). Students who adopt mastery goals focus on developing and improving their ability, while students who adopt performance goals focus on demonstrating their ability. Stated differently, mastery-oriented students engage in a task for the sake of learning and understanding, whereas performance-oriented students engage in a task to show that they can outperform others (Ames, 1992; Ames & Archer, 1988; Dweck, 1986; Midgley, Kaplan, & Middleton, 2001).

Within the literature of the classical theory, mastery goals are preferred over performance goals (Pintrich, 2000). Empirical studies, moreover, have shown that mastery goals are associated with adaptive patterns of learning, while performance

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goals are related to maladaptive patterns (Ames & Archer, 1988; Blumenfeld, & Hoyle, 1988; Dweck & Leggett, 1988; Meece, 1991).

For example, mastery-oriented students are more likely to be intrinsically motivated, use adaptive learning strategies, and attain high levels of performance (Covington, 1992; Elliot & Dweck, 1988; Nolen, 1988). In contrast, performance-oriented students tend to be extrinsically motivated, use superficial learning strategies, and attain lower levels of performance (Ames & Archer, 1988; Meece, Blumenfeld, & Hoyle, 1988). Furthermore, mastery-oriented students put more effort into their studies and persist longer in overcoming problems. In contrast, performance-oriented students easily abandon their efforts in the face of challenge or difficulty (Dweck, 1986; Dweck & Leggett, 1988). Clearly, the implication of the classical studies is that the achievements and learning patterns of students with mastery goals are preferable to those of students with performance goals.

Recent studies have begun to question these implications. Those studies indicate that performance goals have positive or null effects on learning (Kaplan & Midgley, 1997; Roeser, Midgely, & Urdan, 1996; Skaalvik, 1997; Urdan, 1997; Wolters, Yu, & Pintrich, 1996). The conflicting empirical evidence suggests that it may be premature to argue that the effects of performance goals are always negative (Elliot & Harackiewicz, 1996; Pintrich, 2000).

Several studies have attempted to identify the learning circumstances under which performance goals have either positive or negative relationships on outcome measures. For example, Elliot and Harackiewicz (1996) posited that the performance goal construct is comprised of two distinct components, each affecting the learning

processes differently. These components are performance-approach and performance-avoidance goals. The authors argued that the performance-approach component has a positive effect on reaching optimal motivation and learning, while the performance-avoidance component has a negative effect. A number of studies (for example, Elliot & Church, 1997; Elliot & Harackiewicz, 1996) have consistently linked performance-avoidance goals to negative learning behaviors. On the other hand, studies on the effects of the performance-approach goals on achievement have shown conflicting results. In essence, the nature and effects of the performance-approach component remain ambiguous. Taking a multiple-goal perspective, Barron and Harackiewicz (2001) explained that performance-approach goals have a positive influence on learning when they are accompanied by mastery-goal pursuits. Left unexplained, however, was how performance goals function independently of mastery goals. Kaplan and Midgley (1997) examined the moderating role of perceived competence on performance goal effects, arguing that negative performance-goal effects occur only when students perceived their competence level as low. Other research studies, however, have failed to support the proposition that perceived competence moderates the effect of performance goals (Elliot & Church, 1997; Harackiewicz, Barron, Tauer, Carter, & Elliot et al., 2000; Kaplan & Midgley, 1997). Even though those various attempts to clarify achievement-goal effects have helped us better understand the relationship between performance goals and learning outcomes, the effects of performance-approach goals on student learning remain unclear.

Only a few studies have examined the effects of achievement goals on student motivation and achievement when those goals are considered as functions of the

psychological mechanisms behind intrinsic motivation. For instance, according to Deci and Ryan's (1985) self-determination theory, three human psychological needs—competence, autonomy, and relatedness—should be satisfied if an individual is to be intrinsically motivated. Among those three needs, perceived competence (including competence-related constructs such as self-efficacy, academic confidence, and perception of ability) was seen as a moderator to account for performance-goal effects. However, researchers failed to find consistent evidence of such moderation (Kaplan & Midgley, 1997). Because of several limitations of the findings in the literature, however, the results of perceived competence not playing a moderator role between performance goals and learning behavior should be interpreted with caution. The first limitation is that Kaplan and Midgley's (1997) study included only one type of learning outcome measure (adaptive learning strategy use) to test the moderating role of perceived competence. Therefore, further investigation is necessary to test the moderating role of perceived competence for a broad range of learning-related outcome variables. Secondly, Kaplan and Midgley examined perceived competence to clarify the effects of general performance goals. Consequently, their findings cannot be generalized to the effects of performance-approach goals. Further study is therefore warranted that examines the role of perceived competence as a moderator and that explores the effects of the performance-approach goal on a greater variety of learning outcome measures.

Furthermore, in their self-determination theory, Deci and Ryan (1985) postulated that perceived competence should be accompanied by perceived autonomy to have a significant impact on intrinsic motivation. In other words, for a student to

have intrinsic motivation, the student needs to have a strong perception of autonomy (that is, having the freedom to initiate his or her own behaviors) toward task involvement, as well as a perception that he or she is competent. Therefore, competence alone is not the only component of intrinsic motivation; a self-determined form of competence may also need to be necessary. This argument explains reasonably well why perceived competence alone fails to explain the effects of performance goals on student motivation and achievement. As a result, examining the roles of perceived competence as a moderator, as well as the roles of perceived autonomy as a moderator, may help resolve the inconsistencies in research on the effects of performance-approach goals on learning.

The primary purpose of this study was, therefore, to investigate whether two psychological characteristics, perceived competence and perceived autonomy, play roles as moderators in the relationship among achievement goal orientations and a broad range of learning- and achievement-related variables. The results of investigating the moderating roles of perceived autonomy on the effects of performance-approach goals could shed light on the points of conflict in the research and extend our understanding of the relationship between achievement goals and achievement-related measures. In addition, by analyzing the moderating role of perceived competence or perceived autonomy in the effect of a mastery goal and a performance-avoidance goal, this study could be expected to corroborate the consistent effects and uniform natures that the mastery goal and the performance-avoidance goal have shown in the literature. A mastery goal and a performance-avoidance goal have been, as previously mentioned, shown to have a uniform

relationship with learning-related outcomes, positively and negatively, respectively (Ames, 1992; Elliot & McGregor, 2001; Midgley, Kaplan, & Middleton, 2001). Few studies, however, have identified the attributes of a mastery goal that produce positive effects or those of a performance-avoidance goal that produce a negative effect on learning outcomes. Thus, the presence of the moderating effect of perceived competence or perceived autonomy may help explicate the psychological mechanism underlying the positive and negative influences of a mastery goal orientation and a performance-avoidance goal orientation, respectively, as well as corroborate previous literature on the effects of a mastery goal and a performance-avoidance goal.

CHAPTER 2

LITERATURE REVIEW

Classic Achievement Goal Orientation Theory

Much of the research on motivation tends to focus on techniques for quantifying motivation, that is, for describing how much learners are motivated (Ames, 1992; Meece, 1991). Learners are placed somewhere on a continuum from highly to poorly motivated, or they are described as simply motivated or unmotivated (Ryan & Deci, 2000). Those studies, which attempt to establish relative amounts of motivation, presume that highly motivated students spend more time and effort in studying than less motivated students. A closer look at what students do with their study time and effort, however, shows that equally motivated students do not necessarily study and learn in the same way. Dweck (1986) argued that even highly motivated and high-achievement students often show maladaptive learning behaviors, such as reliance on rote memory. That observation suggests that the quantitative aspects of motivation do not fully predict adaptive learning patterns; we also need to examine the qualitative aspects of motivation.

In their attempts to explain why highly motivated students may use maladaptive learning strategies, some researchers have turned to the concept of achievement-goal orientation (Dweck & Elliot, 1983; Maehr & Nicholls, 1980). Achievement-goal orientation has been a useful explanatory tool in accounting for the qualitative aspects of motivation and learning behaviors (for example, choice of task, attribution of success or failure, beliefs about learning, and use of learning strategies)

as well as the quantitative aspects (for example, the amount of effort or persistence).

Achievement-goal orientation theory seems to be especially appealing in that it can explain qualitatively different patterns of learning in terms of mastery and performance goals. In contrast, a quantitative approach to the study of motivation has difficulty explaining the maladaptive learning behaviors that even highly motivated students acquire.

Achievement-goal orientation is defined as a set of purposes or reasons a learner may have for performing an academic task. Classical achievement-goal theory[1] discusses two types of achievement goals, mastery and performance goals, each of which involves different reasons for task engagement (Ames, 1992; Dweck, 1986; Nicholls, 1989). Mastery-oriented students engage in a task for the sake of learning and understanding, whereas performance-oriented students engage in a task to show that they can outperform other students or avoid being outperformed by them (Ames, 1992; Ames & Archer, 1988; Dweck, 1986). For example, students who endorse mastery goals are more concerned about gaining skills and knowledge by mastering the learning materials, whereas students who adopt performance goals are more concerned about showing off their ability to others by receiving better grades than others.

A student's reasons for engaging in a task have much to do with the way the student defines his or her competence for that task (Elliot & McGregor, 2001; Harackiewicz, Barron, Tauer, Carter, & Elliot, 2000; Pintrich, 2000). Both mastery-

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[1] Classical achievement goal theory includes two types of achievement goal orientations, while contemporary achievement goal theory includes three types of achievement goal orientations. Details are discussed later in this chapter.

oriented students and performance-oriented students are concerned with the pursuit of competence in achievement-related settings, but they differ in the ways they define and pursue competence. For example, mastery-oriented students feel competent when they see their academic ability grow (Midgley, Kaplan, & Middleton, 2001). On the other hand, performance-oriented students feel competent when they demonstrate their academic ability to others by showing that they can perform better than others on the task or avoid performing poorly (Midgley, Kaplan, & Middleton, 2001). More importantly, these different reasons for engaging in a task and the different ways of defining and pursuing competence make a great difference in the ways people study and learn (Dweck, Leggett, 1988; Linnenbrink & Pintrich, 2002). Therefore, mastery-oriented students and performance-oriented students adopt qualitatively different learning patterns, which in turn, as researchers believe, predict their achievement-related outcomes (Ames & Archer, 1988; Dweck & Leggett, 1988; Meece, Blumenfeld, & Hoyle, 1988).

Origins of Negative Perceptions about Performance Goals

Within the literature of classic achievement goal orientation theory, many researchers prefer mastery goals to performance goals (Pintrich, 2000). This section discusses the origins of the negative perceptions about performance goals.

Empirical Evidence of the Effects of Performance Goal on Learning Outcomes

One of the main reasons for the general preference for mastery goals and the negative evaluations of performance goals is that empirical studies show that mastery

goals are associated with adaptive learning patterns, while performance goals are

related to maladaptive patterns (Dweck & Leggett, 1988)[2]. For example, mastery-

oriented students are more likely to be intrinsically motivated, use elaboration

strategies, and attain high levels of performance (Elliot & Dweck, 1988; Nolen, 1988).

In contrast, performance-oriented students tend to be extrinsically motivated, use

superficial learning strategies, and attain lower levels of performance (Ames & Archer,

1988; Meece, Blumenfeld, & Hoyle, 1988). Furthermore, mastery-oriented students

put more effort into their studies and persist longer in overcoming problems. On the

other hand, performance-oriented students easily abandon their efforts in the face of

challenges or difficulties (Dweck, 1986; Dweck & Leggett, 1988).

Clearly, the implication of classical achievement-goal orientation studies is

that the learning patterns and achievements of students with mastery goals are

preferable to those of students with performance goals. The contrasting effects of the

two achievement-goal orientations on learning processes and outcomes have favored

mastery goals enough to persuade many researchers and educational practitioners to

denigrate the performance-goal orientation.

Negative View of Extrinsic Motivation

Besides the empirical evidence, a strong argument also reinforces the

negative perception of performance goals. This argument is closely related to

researchers' traditional perceptions about intrinsic and extrinsic motivation.

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[2] The empirical research evidences that are discussed in this section are all based on
the classical achievement goal theory.

According to behaviorism, which emphasizes behavioral reinforcement, one of the prevalent ways of motivating students is to use external inducements to achieve, such as the use of praise or penalties (Ryan & La Guardia, 1999). With the increasing emphasis on human cognition in modern research, however, behaviorism fell into disfavor, and so did extrinsic motivation as an effective approach to learning (Deci & Ryan, 1985). Motivation researchers began to criticize extrinsic ways of motivating students because some research findings showed that the use of external rewards inhibited intrinsic motivation (Deci & Ryan, 1985). Moreover, in the classical literature on motivation, intrinsic and extrinsic motivation were viewed and understood as a dichotomy (Ryan & Deci, 2000). This dichotomous conceptualization called attention to the positive aspects of intrinsic motivation and the negative aspects of extrinsic motivation (Ryan & Deci, 2000). Thus, educational practitioners were encouraged to promote intrinsic motivation over its extrinsic counterpart because intrinsic motivation was believed to be conducive to adaptive learning patterns, while extrinsic motivation was seen to be detrimental to adaptive learning patterns.

This traditional dichotomy of intrinsic and extrinsic motivation extended into achievement goal theory, where it was seen as parallel to the dichotomy of mastery and performance goals. In that latter dichotomy, mastery goals were identified as positively affecting academic achievement, and performance goals were seen to have a negative effect (Ames, 1992, Meece, Blumenfeld, & Hoyle, 1988). Research findings reporting a positive relationship between mastery goals and intrinsic motivation further strengthened the positive perception of mastery goals, whereas

empirical evidence of negative relationships between performance goals and intrinsic motivation has reinforced the negative impression of performance goals (Elliot & Harackiewicz, 1996; Harackiewicz & Elliot, 1993; Harackiewicz, Barron, Tauer, Carter, & Elliot, 2000; Heyman & Dweck, 1992). There are, however, potentially serious problems with the view that mastery goals derive only from intrinsic motivation and that performance goals derive only from extrinsic motivation.

First, it is important to understand that mastery/performance goals and intrinsic/extrinsic motivation were conceptualized to explain different aspects of motivational phenomena. The concepts of mastery and performance goals emerged to account for how people acquire and sustain their competence to achieve at high levels in academic settings (Linnenbrink & Pintrich, 2002; Pintrich, 2000). Academic competence, however, does not necessarily figure into the distinction between intrinsic and extrinsic motivation; rather, the concepts of intrinsic and extrinsic motivation were developed and applied to a broader range of fields (Deci & Ryan, 1985).

Second, while mastery goals and intrinsic motivation share some conceptual similarities in that both concepts are learning-focused and task-focused, they also have distinct differences. Mastery goals do not always involve a personal interest in or an enjoyment of performing a task, which is the core idea of intrinsic motivation. Some mastery oriented students, for example, want to gain competence by mastering learning materials simply because of the value and importance of the task, not necessarily because of their interest in or enjoyment of the task. In that regard, task

involvement with a mastery-goal orientation could be somewhat different from intrinsic motivation. Likewise, the concept of performance goals overlaps the concept of extrinsic motivation in the sense that they both focus not on the task but rather on some external reward. Performance goals and extrinsic motivation differ, however, in that they focus on different ranges and aspects of external rewards, so that their role in relation to learners' motivation and learning may be the same. More specifically, the concept of extrinsic motivation entails a broader range of external rewards (for example, monetary rewards, meeting deadlines, or avoiding punishment), while performance goals involve only competence-related external rewards in academic settings. Competence-related external rewards (for example, a higher GPA than others, receiving public recognition of high academic ability) are a somewhat self-focused type of external reward, one directed toward a change in status. Other types of external rewards (for example, acquiring monetary rewards, meeting deadlines, or avoiding punishment) do not necessarily involve a focus on one's self as much as on an improvement in one's conditions or the satisfaction of requirements. Generally, external rewards may be strong motivators for an individual with extrinsic motivation, but not for the individual who adopts performance goals if the external rewards do not also entail a sense of one's superiority over others in competence or ability. Similarly, in an effort to distinguish extrinsic motivation and performance-approach goals, Wolters, Yu, and Pintrich (1996) made a conceptual distinction between extrinsic goals and relative-ability goals, which are similar to performance goals.

Accordingly, performance goals should not be confused with extrinsic motivation. Any negative image of performance goals caused by an incorrect

association between performance goals and extrinsic motivation needs to be reconsidered.

Research Efforts to Clarify the Effects of a Performance Goal

Recent studies have yielded conflicting results regarding the effect of performance goals on learning outcomes. For instance, some studies have shown that performance goals have null effects on certain achievement-related measures (Kaplan & Midgley, 1997), and others have shown that performance goals have a positive influence on adaptive learning strategies and achievement (Skaalvik, 1997; Urdan, 1997; Wolters, Yu, & Pintrich, 1996). These contradictory results indicate ambiguities or inconsistencies in the ways researchers view performance goals. Thus, many researchers have pointed out that the mixed and inconsistent empirical evidence suggests that performance goals may not always have a negative impact on learning behavior and outcomes, and in fact they may sometimes even promote positive patterns of learning (Elliot & Harackiewicz, 1996; Midgley, Kaplan, & Middleton, 2001; Pintrich, 2000). Consequently, considerable research is currently attempting to determine under what circumstances the positive aspects of performance goals might emerge. The following sections review the research efforts to clarify the nature and impacts of performance goals.

Contemporary Achievement Goal Theory: Differentiation of the Performance Goal Concept

To reconcile the inconsistent findings about the relationship between performance goals and learning outcomes, researchers have used a number of approaches. One of those approaches, perhaps the most notable departure from the classical theory of achievement goals, is the differentiation of performance goals into performance-approach and performance-avoidance goals. Elliot and Harackiewicz (1996) posited that the performance goal construct comprises two distinct components, performance-approach and performance-avoidance goals, each affecting the learning process differently. People with a performance-approach goal orientation are more concerned with demonstrating their competence, while people with a performance-avoidance goal orientation are more concerned with hiding their incompetence. Elliot and Harackiewicz (1996) argued that the performance-approach component has a positive effect on reaching optimal motivation and learning, but the performance-avoidance component has a negative effect.

A number of studies (for example, Elliot & Church, 1997; Elliot & Harackiewicz, 1996) have consistently linked performance-avoidance goals to negative learning behaviors. On the other hand, studies on the effects of the performance-approach goals on subsequent learning have shown conflicting results, indicating that the nature and impact of performance-approach goals are still poorly understood. Some studies have suggested that performance-approach goals are linked to positive outcomes, while other studies have found that performance-approach goals are linked to maladaptive behaviors. For example, Wolters et al. (1996) found that

junior high students adopting a performance-approach goal showed adaptive learning patterns (for example, using deep cognitive and regulatory strategies). In contrast, Kaplan and Midgley (1997), also targeting junior high students, found no relationship between performance-approach goals and adaptive learning strategies. Quite the contrary, they found that performance-approach goals were related to superficial information processing and maladaptive learning strategies.

To explain these inconsistent results from performance-approach goals, some researchers have argued that the regulatory mechanisms of performance-approach goals should be distinguished from those of performance-avoidance goals. Performance-avoidance goals involve a uniform regulatory system, which is avoidance regulation (Elliot, 1997; Elliot & Harackiewicz, 1996). The regulation system of performance-approach goals, on the other hand, is a compound of approach and avoidance regulation behaviors (Grant & Dweck, 2003). This mixture of regulatory behaviors, in turn, may lead to conflicting results for performance goals, with approach regulation leading to positive results on achievement-related outcomes, and avoidance regulation leading to negative results. Importantly, the implication of this differentiation is that complex attributes of performance goals lie in the performance-approach goals, not in the performance-avoidance goals. Even though the nature and effects of the performance-approach component remain ambiguous, the integration of both types of goals—approach and avoidance—into the theory of achievement goal orientation has significantly expanded our understanding of performance goals.

Taking a Multiple-Goals Perspective

Various studies have been designed to help identify the circumstances under which a performance goal (or a performance-approach goal) produces either positive or negative effects (for example, Kaplan & Midgley, 1997; Midgley, Kaplan & Middleton, 2001; Pintrich, 2000). One of the approaches to clarifying the effects of a performance goal (which refers here to a performance-approach goal) was to see achievement goal orientation as involving a composite of multiple goals instead of a single goal. According to this multiple-goals perspective, an individual can adopt and pursue different types of achievement goals simultaneously. Most studies examining the correlation between mastery and performance goals support this multiple-goals perspective, indicating that mastery and performance goals are uncorrelated and thus that they are conceptually independent of each other (Ames & Archer, 1988; Harackiewicz et al., 2000; Nolen, 1988). Thus, a person's adoption of a mastery goal, for example, does not predict whether he/she will pursue a performance goal. In fact, in a real classroom setting, it is more probable that a student will be both mastery- and performance-oriented (or performance-approach oriented) at the same time, rather than pursue only one or the other goal. For example, they may want to understand the material thoroughly (a mastery goal), but they also want to outperform others on the class test (a performance-approach goal).

Yet, survey studies on achievement goals have largely ignored the multiple-goals perspective and have focused on the main effect of single-goal orientations (Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002; Pintrich, 2000). Moreover, experimental studies often assign participants to different goal conditions (a mastery-

oriented condition versus a performance-oriented condition) and then manipulate the

participants' goal orientations and compare the results against levels of motivation

and performance (Pintrich, 2000). Such research designs do not address the effects of

multiple goals. More recently, the advantages of taking a multiple-goal perspective

over a single-goal perspective have been discussed, in that investigations into the

dynamic interplays between mastery goals and performance goals may have the

potential of revealing intricate learners' profiles of achievement goal orientations

(Barron and Harackiewicz, 2001; Harackiewicz et al., 2002; Pintrich, 2000).

Taking this multiple-goal perspective, Barron and Harackiewicz (2001) found

that performance goals have a positive influence on learning when they are

accompanied by mastery-goal pursuits. Left unexplained, however, was how

performance goals function independently of mastery goals. Furthermore, researchers

have become interested in determining which combinations of goal orientations might

lead to optimal levels of learner motivation and performance. An example of a study

examining the effects of multiple goals would be one that explores how persons who

pursue both mastery goals and performance-approach goals differ in their learning

patterns from persons who predominantly pursue one only type of goal. As

hypothesized in the multiple-goal perspective, students who are high in both mastery

and performance goals would show more adaptive patterns of motivation in an

achievement setting (Harackiewicz et al., 2002). In contrast, some researchers argue

that students who are high in mastery goals but low in performance goals should show

the more adaptive patterns (Ames, 1992; Dweck, 1986). The rationale is that a strong

orientation toward performance goals would interfere with the generation of the

positive effects associated with mastery goals (Ames, 1992). Further research is necessary to examine whether performance goals, when paired with mastery goals, function positively or negatively (Harackiewicz et al., 2002).

To understand better the dynamics of multiple-goal pursuits, Harackiewicz et al. (2002) categorized four patterns of multiple-goal effects. First is the view that multiple goals create an additive goal pattern; that is, the mastery and performance-approach goals both have positive effects on outcome measures independently of each other. More specifically, it is posited that having both mastery and performance goals simultaneously produces the most adaptive learning patterns because the positive effects of performance goals are added to the positive effects of mastery goals.

The second view is that a combination of mastery and performance-approach goals may create an interactive goal pattern on a single learning outcome. According to this view, the effects of a performance goal may depend on whether or not it is paired with a mastery goal (Bouffard et al., 1995; Elliot & Church, 1997; Pintrich, 2000; Wentzel, 1991, 1993). In other words, a performance goal produces a positive learning pattern when the performance goal is combined with a mastery-goal orientation, but the performance goal produces a negative learning pattern when it is pursued independently.

Thus, both the additive and interactive effects suggest the efficacy of performance-approach goals (Pintrich, 2000). If the effects are additive, positive performance-goal effects do not depend on a high level of mastery goals. If the effects are interactive, as Midgley et al, (2001) argue, positive performance-goal effects depend on a high level of mastery goals.

A third way of explaining how a combination of mastery and performance-approach goals can affect learning is to view the combination as creating a specialized goal pattern. For example, mastery goals might predict interest but not achievement, whereas performance-approach goals might predict achievement but not intrinsic motivation. Therefore, performance-goal effects depend on which outcomes are taken into consideration (Pintrich, 2000). For example, performance goals have predicted positive academic performance in introductory college classes, when mastery goals did not (Harackiewicz et al., 1997). More recent, meta-analytical research targeting studies involving college students have suggested that the performance-approach goals are better predictors of achievement, while mastery goals are better predictors of interest (Harackiewicz et al., 2002). Elliot and Church (1997) reported that the adoption of mastery goals led to enhanced intrinsic motivation but had no effect on graded performance, whereas the adoption of performance-approach goals led to better performance but had no influence on intrinsic motivation. The adoption of a performance-avoidance goal has deleterious effects on both intrinsic motivation and graded performance.

A fourth way that multiple goals may influence learning is that a goal pattern arises in which the individual selectively focuses on whichever achievement goal is most relevant at any given time. In other words, students can select the different goals in different situations and adapt their learning patterns accordingly.

Possible Moderator Variables

Another approach to determining the effects of performance goals is to identify moderator variables, such as perceived competence, achievement orientation, and learning context. The presence of moderating effects means that some moderator variables interact with a performance goal and thus influence the relationship between the performance goal and learning outcomes. The literature of achievement-goal orientation has identified several typical competence-related moderator variables, such as perceived competence, self-efficacy, and perceived ability. For instance, Dweck noted that the influence of performance goals on subsequent learning behavior is a function of the individual's perceived ability (Dweck, 1986; Dweck & Leggett, 1988). Some researchers have hypothesized that the effect of performance goals is positive for students with a high perception of their own competence and negative for those with a low perception of their competence (Dweck, 1986; Dweck & Leggett, 1988; Elliot & Dweck, 1988). In an experimental study in which individuals' achievement goal orientations were manipulated, Elliot and Dweck (1988) found that individuals acting on mastery goals displayed adaptive learning patterns regardless of their perceived level of ability. In contrast, individuals acting on performance goals displayed a variety of learning patterns, depending on their perceived levels of ability. Specifically, individuals who assessed their skills as high exhibited adaptive patterns, whereas those who assessed their skills as low exhibited maladaptive patterns.

Some studies, however, have failed to find evidence that perceived competence moderates the relationship between performance goals and learning outcomes (Bandura & Dweck, 1985; Elliot & Harackiewicz, 1996; Harackiewicz et

al., 1997; Harackiewicz et al., 2000; Kaplan & Midgley, 1997). For example, Bandura and Dweck (1985) found that performance goals are associated with the avoidance of challenge, even in participants with high levels of confidence. Kaplan and Midgley (1997), on the other hand, found that perceived competence functions as a moderator of the relationship between mastery goals and learning outcomes, but not of the relationship between performance goals and learning outcomes. In addition, Harackiewicz and her colleagues (1998) found that self-efficacy had no moderating effects on the relationships between performance-approach goals and actual performance.

Another moderator discussed in the goal-orientation literature is achievement orientation, which is defined as the person's need for achievement. The hypothesis is that the effect of performance or mastery goals on intrinsic motivation varies as a function of the person's level of achievement orientation. Performance goals were reported to be associated with adaptive learning patterns for learners high in achievement orientation and maladaptive patterns for those low in achievement orientation (Harackiewicz and Elliot, 1993). In their experimental study, Senko and Harackiewicz (2002) also found that mastery goals increase learning interest for individuals low in achievement orientation, while performance goals increase learning interest for individuals high in achievement orientation. The authors claimed that people who adopt performance goals and who have high achievement orientations could maintain or increase their interest because they considered performance-focused context as challenging. In contrast, performance-oriented people with low achievement orientations were more likely to lose their interest because they saw the

context as threatening.

Researchers have also reported evidence that the effect of performance-approach goals on learning interest varies as a function of learning context (Harackiewicz et al., 1998). It has been argued, for example, that performance goals may produce more adaptive learning patterns when they are pursued in a performance-oriented context than when they are pursued in a mastery context (Harackiewicz and Sansone, 1991). Similarly, mastery goals enhance learning interest when they are pursued in a mastery-oriented learning context, rather than when they are pursued in a performance-focused context (Sansone, Sachau & Weir, 1989).

Inconsistent Definitions of Performance Goals

Some authors have argued that disagreements among researchers about the definition of performance-approach goals may be one of the reasons for the mixed results from studies into the effects of performance goals (Barron & Harackiewicz, 2000; Elliot, 1999; Harackiewicz, Barron, Pintrich, Elliot, & Thrash, 2002; Urdan, 1997). Researchers generally concur that the main principle of the performance goal construct is that the individual having this goal wants to demonstrate his/her ability and outperform others (Senko & Harackiewicz, 2002). Despite this consensus among researchers about what constitutes the key concept of a performance goal, a closer look at items that have been used to measure performance goals tends to reveal slight variations among researchers in their operational definitions of performance-approach goals. Surprisingly, however, little attention has been paid to this divergence in ways to measure performance goals. Some researchers focus on the social-comparison

aspect of performance-approach goals (for example, "I want to do better than others"),

while others focus only on the learner's intent to demonstrate his or her ability or to

receive better outcomes without any reference to social comparison (for example, "I

want to do well on this test"). Additionally, Senko and Harackiewicz (2002) pointed

out that social recognition or approval is emphasized in some survey measures of

performance goals (for example, "I want to show my high ability to others"), but not

others (for example, "I want to validate my ability"; see, for example, Elliot & Dweck,

1988; and Midgley & Middleton, 1997). Elliot (1999) has argued that self-

presentational desires (for example, "I want to look good to others") are separate from

performance goals because the former are not directly concerned with the pursuit of

competence. Senko and Harackiewicz (2002) also maintained that researchers should

consider performance goals separately from self-presentational concerns and observed

that people can seek social approval in ways that do not involve demonstrations of

competence.

These conceptual components, though still under debate, are believed to

constitute the performance-approach goal construct and could contribute to the variety

of roles of performance-approach goals in relation with learning behavior and

outcomes.

Toward a Reconciliation of the Research Findings

Considerable research has been conducted to reconcile the conflicting

empirical evidence regarding the effects of performance goals on learning outcomes.

Some research has made progress in that attempt; however, further study is necessary,

especially to characterize the effect of performance-approach goals on learning patterns. Because it is impossible to imagine an education setting without any competition or in which all learning tasks are inherently interesting or enjoyable, performance goals and extrinsic motivation will remain part of classroom settings. A more positive approach, therefore, is to find ways to elicit the adaptive functions of performance goals. Because looking at the general impact of performance goals on learning patterns could mislead us to a hasty conclusion that performance goals are detrimental, more thorough investigation is needed to find out when or for whom performance goals (or performance-approach goals) function in the most optimal way. In doing so, further efforts to explore other possible moderators are needed. Identifying additional moderators may lead to both theoretical and practical understandings on how teachers might alter characteristics of learning environments in a way to maximize the positive role of both mastery and performance goals (or performance-approach goals). In addition, identifying possible mediators of the relationships between performance goals and outcomes may help us gain further understanding of the underlying interrelationships between performance goals and various learning patterns. This more accommodating approach can be much more productive for students than sticking to the unrealistic attitude that exhorts teachers to advance mastery goals to the exclusion of performance goals (or performance-approach goals).

Self-Determination Theory

As discussed previously, investigations into other possible moderators are needed to illuminate the effects of performance-approach goals. In the following sections, research on self-determination theory is reviewed to explore the role of perceived competence and perceived autonomy as potential moderators.

Three Human Psychological Needs

Self-determination theory (SDT) provides an insight into a psychological mechanism that leads to positive consequences in one's life, namely, a subjective sense of well-being. The research awareness of a psychological process is important because it unveils pathways to outcomes that people desire. The SDT posits that persons function optimally when they perceive themselves as competent, autonomous, and related to others. According to the theory, a person's behavior has efficacy only when the person feels self-determined through the satisfaction of his or her psychological needs. Consequently, in the SDT perspective, competence, autonomy, and relatedness are basic human psychological needs, and meeting those needs is crucial for the enhancement of life and well-being (Deci & Ryan, 1985; Deci & Ryan, 2000). Those needs, moreover, are inborn and universal (Deci & Ryan, 1985), and, therefore, across diverse cultures (e.g., individualistic vs. collectivistic cultures), feelings of autonomy, competence, and relatedness are key to an individual's psychological or intellectual growth. The need for competence is defined as the need to know through experience that one has the capability of completing given tasks successfully. The need for autonomy refers to the need to know through experience

that one has the freedom to initiate and regulate one's behavior without being

controlled by others (deCharms, 1968; Ryan & Grolnick, 1986). Finally, the need for

relatedness refers to the need to know through experience that one is connected with

others (Levesque, Zuehlke, Stanek, & Ryan, 2004).

Perceived Competence

Self-perceptions and self-evaluations of ability and competence have

received much attention in motivational research because of their strong relationships

with motivation and performance. Competence-related concepts, such as perceived

competence, perceived ability, self-efficacy belief, and control, are somewhat

differently formulated in many motivation theories (e.g., self-determination,

achievement goal orientation, self-efficacy, and attribution theories).

Perceived competence in self-determination theory one of the three

psychological needs (along with autonomy and relatedness). In most research based

on self-determination theory, the degree to which individuals perceive themselves as

competent has been a measure of the degree of their satisfaction from meeting those

psychological needs.

The concept of perceived competence is close to that of self-efficacy in that

it refers to an individual's expectancy of success; that is, students' perception of

competence is defined as their subjective belief about their capabilities of successful

task performance. A number of studies have shown that perceived competence

influences intrinsic motivation (Bandura & Cervone, 1983; Harter & Jackson, 1992).

Self-determination theory, however, posits that the satisfaction of the need for

competence is necessary, but not sufficient, for optimal functioning or intrinsic

motivation. Increases in intrinsic motivation in tandem with increases in perceived

competence occur only when the person also feels self-determined with respect to the

activity. Thus, the need for competence does not alone underlie intrinsic motivation;

the competence must be self-determined (Deci & Ryan, 1985). In support of this

claim, empirical studies have reported that, when persons work in conditions that

support their autonomy, their strivings for competence are most effective (Danner &

Lonky, 1981; Levesque, Zuehlke, Stanek, & Ryan, 2004). In sum, the feeling of one's

own competence is an important factor in producing positive behaviors. How

effective that perceived competence will be, however, depends on how much the

context supports or undermines the autonomy with which the individual pursues that

sense of competence. This idea suggests that perceived autonomy may complement

any moderating role of perceived competence. Thus, the examination of perceived

competence alone as a moderator could fail to account for the inconsistencies of a

performance-approach goal effect unless it included the degree that the context

supported or inhibited autonomy.

Perceived Autonomy

As a central construct in self-determination theory, autonomy is defined as

the freedom to initiate and regulate one's behavior. Key concepts involving autonomy

should be carefully defined in the research. First, references to *control* in the literature

should carefully distinguish between control over success or failure and control over

initiation and regulation of behavior. The former refers to a locus of control, which is

contingent upon ones' behavior and its outcomes; the latter refers to a locus of

causality, which is the connection between volition and action (Patrick, Skinner, &

Connell, 1993). Both the locus of control and locus of causality may be called into

play to analyze whether a particular locus of causes is internal or external;

nevertheless, it must be remembered that they focus on different aspects of causes, the

causes of outcomes (locus of control) and the causes of behavior (locus of causality).

Thus, autonomous behaviors have an internal locus of causality, not necessarily an

internal locus of control (deCharms, 1968; Ryan, 1995). Examples of the distinction

between autonomy and control would be cases in which (1) the individual may be

autonomous, but not in control of consequences of behavior, or (2) the individual may

be in control but not necessarily autonomous.

According to the definition of autonomy, the degree of autonomy has much to

do with the motives for the initiation of behavior (Patrick, Skinner, & Connell, 1993).

Accordingly, the extent to which the motives for initiating behavior are in accord with

one's own value system determines the degree of autonomy. The degree of autonomy

represents the multiple reasons for regulating behavior, and its implication is that

those reasons may differentially influence how one feels, thinks, and behaves

inasmuch as they differ in regard to autonomy.

In the dichotomous view of motivation, only the locations of the motives are

discussed, that is; whether the motives are external or internal to a task. External

motives are aligned with extrinsic motivation, while internal motives are aligned with

intrinsic motivation. Deci and Ryan (2002), however, argued that external motives

involve various forms of external motives that are qualitatively different in degrees of

perceived autonomy. Those authors reformulated the dichotomous view of motivation (extrinsic vs. intrinsic) into a more continuous framework in which extrinsic motivation was decomposed into external, introjected, and identified regulation, depending on the degree of autonomy. External regulation denotes that one's behavior is regulated by external forces, such as monetary rewards or external pressure. This type of regulation, the most extrinsic type of motivation, represents the lowest level of autonomy because motives such as monetary rewards have no connection with either a task or one's self. One's engagement in the task is meaningless in the absence of the external motives. The introjected regulation denotes that one's behavior is regulated by one's internal pressures, such as those exerted by one's sense of obligation or feelings of guilt and anxiety. This type of motive stems from an external pressure that is internalized, but it is not quite accepted as being aligned with one's own values. Thus, individuals whose behaviors are regulated by introjected motives feel less autonomous because they feel responsible for the activity, but they do not truly want to perform it. The identified regulation refers to behavior regulation that is based on the self-endorsed value of the task. The motives for this behavior are more autonomous and self-determined because the reasons for performing the task are associated with the task itself, but they take the forms of external motives because the value of the task is still instrumental (means to an end) rather than intrinsic. On the other hand, intrinsic motivation occurs only when the reasons for involvement in a task emanate from the intrinsic value of a task as an end in itself, which will in turn lead to one's enjoyment and satisfaction. The SDT characterizes external and introjected regulations as more controlled types of motivation, while identified and

intrinsic regulations are more autonomous types of motivation.

Both autonomous and controlled behaviors are motivated or intentional, but their regulatory processes are different. The regulatory process of self-determined behavior is choice, whereas that of controlled behavior is compliance. Motivated behaviors that are regulated by different processes (that is, autonomous motives versus controlled motives) bring about quite different cognitive, affective, behavioral outcomes. For example, individuals whose behavior is regulated by motives that are more autonomous tend to demonstrate higher levels of academic performance (Black & Deci, 2000; Boggiano, Flink, Shields, Seelbach, & Barrett, 1993; Gronlick & Ryan, 1987). In addition, learners with autonomous motivation display higher levels of perceived competence and life satisfaction (Ryan & Gronlick, 1986), while learners with controlled motivation are more likely to exhibit negative emotions, such as distress and anger (Patrick, Skinner, & Connell, 1993). Overall, a large body of literature shows that autonomous motives are linked to more favorable consequences of behavior than controlled motives.

The current study examines perceived competence and perceived autonomy as possible moderators of the effects of achievement goals on learning-related outcomes. Autonomous students are viewed in the literature as more goal-directed and more willing to take responsibility for their own learning. Such students adopt goals that arise from within themselves, as opposed to goals imposed upon them by other agents. Sheldon and Elliot (1998) reported that, compared with the pressure from external control, autonomy in the pursuit of achievement goals is more closely associated with personal dedication to goals and their achievement. For this study,

therefore, performance goals are hypothesized to facilitate positive outcomes such as achievement, adaptive learning strategies, interest, and effort when the learners who pursue those goals have a high degree of perceived autonomy.

Relationship of Self-Determination Theory and Achievement Goal Orientation Theory

Achievement goal orientation theory is concerned with the learner's purposes for performing an academic task, and self-determination theory is concerned with the reasons for task involvement. Even though achievement goals and self-determination have been studied separately and are considered distinctly different motivational constructs, their basic concerns appear very similar. In fact, it is intriguing to see how they are similar and different.

Both theories are concerned with the underlying motivations for an individual's behaviors, but they focus on different dimensions of those motivations. Achievement-goal theory, as described earlier, explores how people pursue competence, which involves its own set of reasons for task engagement. Persons who pursue competence by developing their ability and those who pursue competence by demonstrating their ability are likely to have different purposes for learning. The former seek to understand and acquire knowledge or skills; the latter seek to outperform others. On the other hand, self-determination theory postulates that the degree to which one is self-determined with respect to a task affects one's engagement pattern in a task, and perceived autonomy plays a central role in determining the degree of self-determination. The construct of perceived autonomy is concerned with

how people initiate and regulate their behaviors. For some individuals, behavior is initiated and regulated by external pressure or rewards; for other individuals, behavior is initiated and regulated by their freedom of choice or volition. These two types of individuals are clearly involved in the task for different reasons, and the presumption is that the former individuals are involved in the task for more extrinsic reasons.

Despite the contributions that achievement-goal theory and the self-determination theory have both made to the study of motivation so far, few studies have examined how the two theories are related to each other and how they may jointly affect learner motivation and performance. Any attempt to combine the two theories, however, must resolve a difficult question: To what extent are people autonomous in pursuing competence? The range of behavioral patterns encompassed by the pursuit of competence is, according to achievement-goal orientation theory, explained by the range of reasons or purposes individuals have for task engagement. The reasons for task engagement, however, can be either autonomous or controlled. Thus, the levels of autonomy of goal adoptions are distinguishable from the content foci (mastery or performance) of achievement-goal orientations.

Berg, Janoff-Bulman, and Cotter (2001) showed that autonomous motives are related to the performance-approach orientation, while controlled motives are related to the performance-avoidance orientation. Consequently, it is likely that mastery goals, which reflect approach motivations, are inherently more autonomous, because the desire to develop an ability or skill tends to come from an internal locus of causality, such as a sense of dedication to oneself, rather than from some external pressure. Thus, it can be predicted that students who adopt mastery goals are likely to be more

autonomous in their pursuit of goals. In contrast, performance-avoidance goals do not likely lend themselves to autonomous behaviors; instead, they are goals in direct response to external forces (for example, evaluative pressures) that control avoidance behavior. On the other hand, in light of the ambiguous nature of a performance-approach goal, the reasons for adopting a performance-approach goal may vary with the degree of autonomy. For instance, some students who adopt performance goals may want to outperform others to live up to their parents' expectations. In this case, the students are not self-determined in their pursuit of performance goals because they do not choose the goals based on their own values. Conversely, some students may adopt a performance-approach goal because their ability to outperform others is important in their value system. In that case, performance-approach-oriented people may feel self-determined because the goal adoption was based on their own choice.

In sum, linking the idea of self-determination theory to that of achievement-goal orientation may explain psychological mechanisms (perceived autonomy as well as perceived competence) that underlie the effects of achievement goal orientations. Moreover, such a linkage may help explain why the effects of performance-approach goals reported in the literature are inconsistent, while the effects of mastery and performance-avoidance goals are consistently unidirectional. The autonomous regulation of behaviors in the pursuit of mastery goals may account for the positive association between mastery goals and adaptive patterns of learning, and the controlled regulation of behavior in the pursuit of performance-avoidance goals may account for the negative association between performance-avoidance goals and adaptive patterns of learning. On the other hand, if the pursuit of a performance-

approach goal includes both autonomous and controlled regulation behaviors, the goal orientation may show a positive relationship with adaptive patterns of learning when autonomous regulation is predominant, and it may show a negative relationship when controlled regulation is predominant. Therefore, it can be predicted that the effect of performance goals will vary as a function of the degree to which the need for autonomy is satisfied. Consequently, performance goals accompanied by high levels of autonomy are predicted to produce positive patterns of learning.

The Purpose of This Study

The primary purpose of this study was to explore psychological processes that affect the relationship between achievement goal orientations and various learning outcomes. In doing so, the study first examined the relationships between achievement goal orientations and perceived competence and perceived autonomy. The study then investigated the possibility that perceived competence and perceived autonomy moderate the effects of achievement-goal orientations on learning outcomes. In addition, the study examined the roles of perceived competence and perceived autonomy in determining the most beneficial types of multiple-goal pursuit.

The findings that perceived competence and autonomy do indeed act as moderating variables might extend our understanding of the relationship between achievement goals and learning outcomes. The first implication of this study is that the presence of the moderating effects of perceived competence and perceived autonomy helps explain certain inconsistencies in the research of performance-goal effects. Those inconsistencies have to do with questions of when and for whom performance-approach goals produce positive learning behaviors. When teachers appreciate how perceived competence and perceived autonomy figure into learning, they more prepared to create the conditions in which performance goals produce positive learning patterns. The second implication of this study would be that the presence of moderating effects helps us understand the psychological mechanisms that underlie the nature of mastery and performance-avoidance goals and their effects on learning.

CHAPTER 3

HYPOTHESIS

In this chapter, the research questions that this study is to address are first presented, and then hypotheses and their rationale are outlined.

Research Questions

1. What are the relationships among achievement goal orientations and the following two psychological characteristics: perceived competence and perceived autonomy?

2. What are the roles of perceived competence and perceived autonomy in the relationship between achievement goal orientations and learning-related measures?

   2(a). Does perceived competence moderate the effects of achievement goal orientations on learning-related outcome measures?

   2(b). Does perceived autonomy moderate the effects of achievement goal orientations on learning-related outcome measures?

3. Do perceived competence and perceived autonomy play roles in determining the most beneficial type of multiple-goal pursuit?

   3(a). Does perceived competence moderate the effects of multiple-goal pursuit on learning-related outcome measures?

   3(b). Does perceived autonomy moderate the effects of multiple-goal pursuit on learning-related outcome measures?

Hypothesis 1

It was hypothesized that some differences exist among the three different types of goal orientations in terms of their relationships to perceived competence and perceived autonomy.

Hypothesis 1(a)

It was hypothesized that a mastery goal and a performance-approach goal are positively associated with perceived competence, while a performance-avoidance goal is negatively associated with perceived competence.

*Rationale for Hypothesis 1(a)***:** Achievement goal orientations are often understood as a 2 x 2 framework that represents two different content foci for goals and two valences (approach vs. avoidance) of motivation (Elliot & McGregor, 2001). These two underlying dimensions of achievement goal orientations can be the basis for predicting relationships between achievement goal orientations and perceived competence.

Achievement goal orientations were originally conceptualized as the individual's different reasons for engaging in a task (Ames, 1992; Dweck & Leggett, 1988). The current literature gives particular attention to two distinct types of purposes: mastery- or learning-focused purposes and performance-focused purposes (Urdan, 1997). The former purpose is generally termed a *mastery goal*, and the latter purpose is generally termed a *performance goal*.

The other dimension of the achievement goal orientation, the valence of

motivation, comprises approach and avoidance motivations (Elliot & McGregor, 2001). Students with approach motivation are likely to advance further to accomplish their adopted goals, while students with avoidance motivation are afraid of losing what they have already attained.

These two underlying dimensions differentiate four types of goal orientation: mastery approach, mastery avoidance, performance approach, and performance-avoidance. According to the two dimensions of the achievement goal framework, for example, a mastery goal[3] and a performance-approach goal are different in that each goal represents two different goals for engaging in the task, but they are similar in that both goals represent approach motivations.

The hypothesis regarding the relationship between an achievement goal orientation and perceived competence draws upon the dimension of valence of the achievement goal pursuit (approach vs. avoidance motivation) rather than on the dimension of the content focus of the achievement goal pursuit (mastery vs. performance goal). In other words, the valence of achievement goal pursuit determines the relationship among achievement goal orientations and perceived competence. Students with high competence are more likely to have approach motivation than avoidance motivation, thus leading them to endorse a mastery-approach goal or a performance-approach goal. On the other hand, students with low competence are more likely to have avoidance motivation, and they are more likely to adopt a performance-avoidance goal. As a consequence, the association of the

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[3] A *mastery goal* in the present study refers to a mastery-approach goal. A mastery-avoidance goal was not included as a part of the hypotheses in this study because there is scant evidence in the literature about mastery-avoidance goal orientation.

approach motivation and high competence may help predict a positive association between achievement goal orientations with the approach valence and perceived competence (for example, between a mastery goal and perceived competence or between a performance-approach goal and perceived competence). Similarly, the association between the avoidance motivation and low competence indicates that there may be a negative association between a performance-avoidance goal and perceived competence.

Hypothesis 1(b)

It was hypothesized that a mastery goal is positively related to perceived autonomy and a performance-avoidance goal is negatively related to perceived autonomy. On the other hand, a performance-approach goal is hypothesized to be unrelated to perceived autonomy.

***Rationale for Hypothesis 1(b)*:** Previous studies reported that mastery-oriented students tended to enjoy doing an activity and persisted longer in the face of difficulties (Covington, 1992; Elliot & Dweck, 1988; Nolen, 1988; Miller, Greene, Montalvo, Ravindran, & Nichols, 1996), which is also an indication that a mastery goal is positively related to intrinsic motivation. According to self-determination theory, intrinsic motivation is a prototype of autonomous motivation (Deci & Ryan, 2000). Therefore, mastery-oriented students are predicted to show more autonomous types of motivation, possibly because an autonomous motive may direct an individual to pursue a mastery goal. The concern of mastery-oriented students about improving

and developing their ability may stem from their desire to learn, which represents the autonomous type of motivation. Accordingly, the high level of intrinsic motivation that mastery-oriented students tend to show may stem from the autonomous regulation underlying the adoption of a mastery goal.

It has been shown that performance-avoidance oriented students tend to focus on hiding their inability (Elliot, McGregor, & Gable, 1999) , and therefore they are likely to show maladaptive patterns of learning (for example, withdrawing their effort in the face of difficulties) and to lose interest in performing a task. These findings indicate that performance-avoidance goals are negatively related to intrinsic motivation. This relationship indicates that a performance-avoidance goal may be negatively related to perceived autonomy, because the lack of intrinsic motivation represents a lower degree of autonomy. Performance-avoidance goals are likely to be less autonomous in regulating behavior because the concern for hiding incompetence may originate from external or internal pressures, such as worries or anxiety, which signal less autonomous type of motivation.

In contrast to the mastery and performance-avoidance goals, the performance-approach goals are predicted to have no or less relationship with perceived autonomy. The person's desire to surpass others and to demonstrate his or her superior ability derives from a variety of sources. For example, it may originate from external pressures, such as a need to meet teachers' or parents' expectations, which result in a more controlled type of motivation (lack of autonomy). On the other hand, the person's choice or intention to outperform others, which is more a autonomous type of motivation, may be the source of pursuing a performance-

approach goal. Therefore, students who choose the performance-approach goals are likely to show considerable variation in their levels of perceived autonomy. This hypothesis is consistent with that of self-determination theory, which posits that extrinsic motivation varies in the degree of autonomy.

Hypothesis 2

It was hypothesized that two psychological characteristics—perceived competence and autonomy—play roles as moderators of the relationship between specific types of single goal orientation and outcome measures.

Hypothesis 2(a)

Perceived competence was predicted to function as a moderator of the relationship between achievement goal orientations and various learning- or achievement-related variables (achievement, adaptive learning strategies, task interest, and effort).

***Rationale for Hypothesis 2(a)*:** As discussed earlier, perceived competence may lead to the adoption of an approach motivation, which in turn can play a major role in the positive influences that a mastery goal and a performance-approach goal has on learning- or achievement-related outcome measures. Perceived competence may facilitate the positive role of the approach component of a mastery goal and a performance-approach goal, which boosts the beneficial effect that a mastery goal or a performance-approach goal has on outcome measures. Moreover, perceived

competence will, through the compensation of its positive influence on outcome measures, buffer the negative effect of a performance-avoidance goal.

Hypothesis 2(b)

Perceived autonomy was predicted to function as a moderator of the relationships between achievement goals and various learning- or achievement-related variables (achievement, adaptive learning strategies, task interest, and effort).

More specifically, it was hypothesized that perceived autonomy would moderate the effects of mastery goals. In other words, a strong perception of autonomy would strengthen the positive relationship between mastery goals and learning- or achievement-related variables (achievement, adaptive learning strategies, task interest, and effort).

It was hypothesized that perceived autonomy would moderate the effects of performance-approach goals on learning- or achievement-related variables (achievement, adaptive learning strategies, task interest, and effort). The relationship between performance-approach goals and achievement-related variables would differ depending on the level of perceived autonomy.

It was also hypothesized that perceived autonomy would moderate the *strength* of the effects of performance-avoidance goals. In other words, a strong perception of autonomy would reduce the negative relationship between performance-avoidance goals and adaptive learning outcomes (intrinsic motivation, adaptive learning strategies, performance).

***Rationale for Hypothesis 2(b)*:** Consistent with previous studies on the relationship between mastery goals and learning outcomes (Ames, 1992; Elliot & McGregor, 2001), it was predicted that mastery goals have a positive impact on adaptive-learning outcomes regardless of students' perception of autonomy. Moreover, its positive relationship with adaptive outcome measures will be greater when the students' perception of autonomy is higher. It has been found that students' autonomous self-regulation is positively linked to intrinsic motivation (Deci & Ryan, 1985, Deci & Ryan, 2000), which in turn has a positive influence on the adaptive use of learning strategies and performance. Therefore, the positive impact of the student's perception of autonomy on intrinsic motivation will boost the positive effects of mastery goals on learning and performance.

Performance-avoidance goals are also predicted to show a negative relationship with outcome measures. This prediction is consistent with the current research (Elliot & Church, 1997; Elliot & Harackiewicz, 1996; Middleton & Midgley, 1997), but the negative relationship of performance-avoidance goals with adaptive outcome measures will be greater when the students' perception of autonomy is low. The positive impact of student perception of autonomy on intrinsic motivation will buffer the negative effects of performance-avoidance goals on learning and performance.

Because extrinsic motivation with different degrees of autonomy plays a qualitatively different role in motivation and performance, according to self-determination theory, the effects of performance-approach goals on outcome measures will vary as a function of perceived autonomy. Inconsistent results on performance-

approach goal effects may be explained by the moderating role of perceived autonomy. The negative effects of performance-approach goals on learning outcomes may occur only when students perceive that their behavior is controlled. Performance-approach goals will be adaptive when students feel autonomous in regulating their behavior.
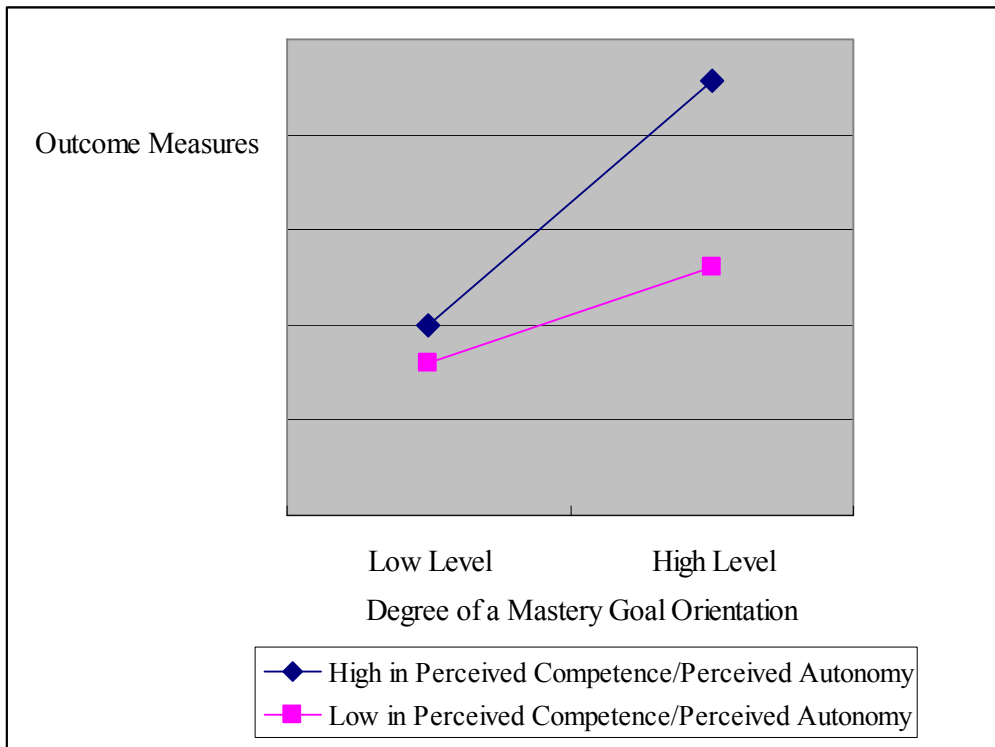
Figure 3. 1 The Two-Way Interaction Effects Between a Mastery Goal and Perceived Competence (or Perceived Autonomy) on Learning-related Outcome Measures Dependent Variables include the measures of Achievement, Adaptive Learning Strategy Use, Interest, and Effort; Independent Variables include the measures of Performance-Approach goal, Mastery goal, Perceived Competence (or Perceived Autonomy).
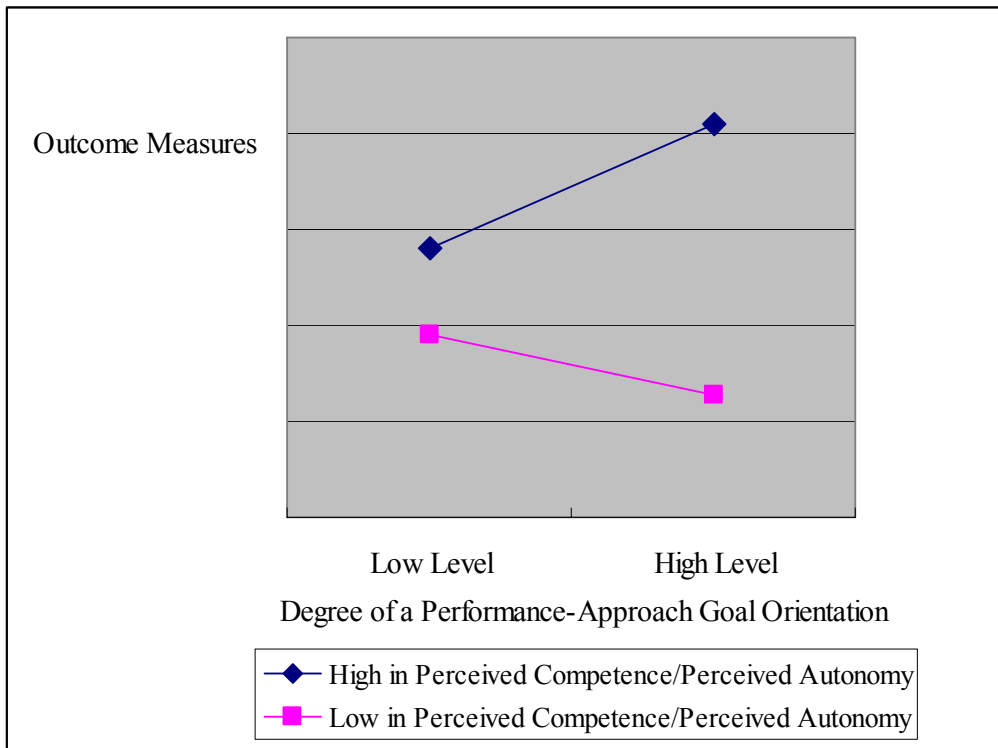
Figure 3. 2 Two-Way Interaction Effects Between a Performance-Approach Goal and Perceived Competence (or Perceived Autonomy)

Dependent Variables include the measures of Achievement, Adaptive Learning Strategy Use, Interest, and Effort; Independent Variables include the measures of Performance-Approach goal, Mastery goal, Perceived Competence (or Perceived Autonomy).
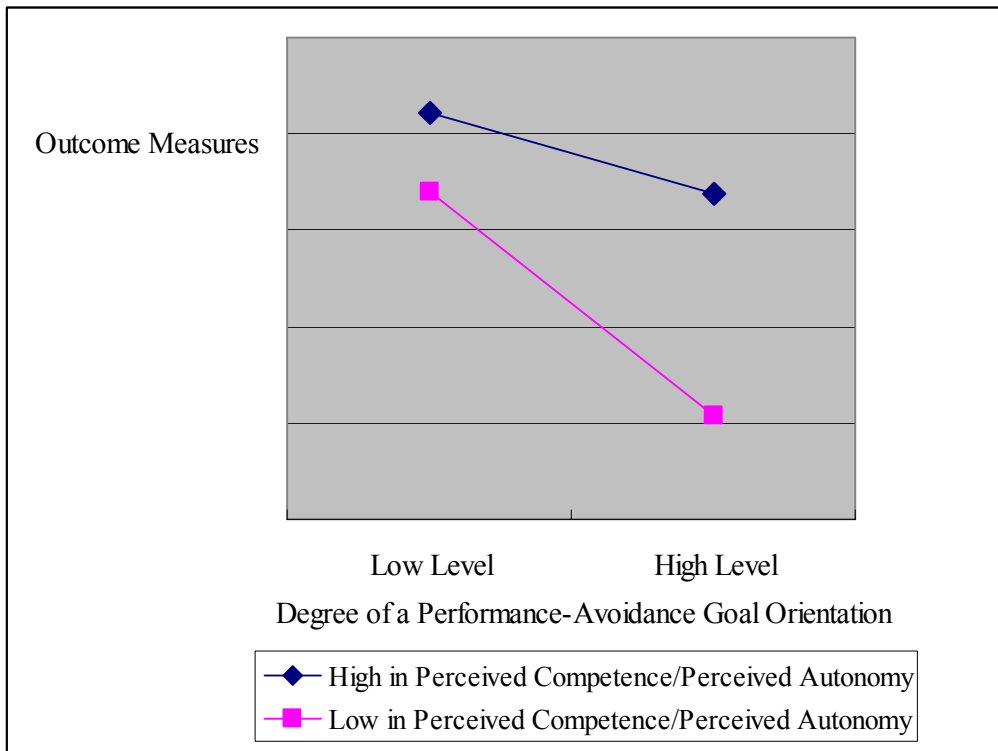
Figure 3. 3 Two-Way Interaction Effects Between a Performance-Avoidance Goal and Perceived Competence (or Perceived Autonomy)

Dependent Variables include the measures of Achievement, Adaptive Learning Strategy Use, Interest, and Effort; Independent Variables include the measures of Performance-Approach goal, Mastery goal, Perceived Competence (or Perceived Autonomy).

Hypothesis 3

It was hypothesized that perceived competence and autonomy moderate the effects of multiple goal orientations on outcome measures (achievement, adaptive learning strategies, interest, and effort).

Hypothesis 3(a)

Among the students high in perceived competence, those adopting both a mastery goal and a performance-approach goal were predicted to show the most adaptive patterns of learning and achievement. On the other hand, of the students low in perceived competence, those who predominantly pursue a mastery goal (without adopting a performance-approach goal) will show the most adaptive pattern of motivation.

Hypothesis 3(b)

Among the students high in perceived autonomy, those who pursue both a mastery goal and a performance-approach goal were predicted to show the most adaptive pattern of learning and achievement. On the other hand, among students low in perceived autonomy, those who dominantly pursue a mastery goal (without adopting a performance-approach goal) will show the most adaptive pattern of motivation.

Rationale for Hypothesis 3(b): There are two perspectives on how to view performance goals: the mastery perspective (traditional view) and the multiple-goal perspective. From the mastery perspective, a performance goal is viewed as undesirable because a performance goal is believed to result in a maladaptive pattern of learning and achievement (Midgley, Kaplan, & Middleton, 2001). In contrast, from the multiple-goal-perspective, a performance goal is viewed to be just as desirable as a mastery goal (Barron & Harackiewicz, 2001, Harackoewicz, Barron, Pintrich, Elliot, & Thrash, 2002). Thus, the mastery goal perspective claims that pursuing a single mastery goal only promotes the most optimal pattern of learning. The multiple-goal perspective, however, claims that the adoption of both mastery and performance goals leads to the most adaptive pattern of learning. While the literature shows inconsistent results on the effects of performance goals, studies examining the effects of multiple goals have reported mixed results as to which combinations of multiple goals produce optimal motivation and learning.

Hypothesis 3 drew upon the same rationale for the Hypothesis 2 because Hypothesis 3 extended the same prediction that Hypothesis 2 made into the context of multiple goal pursuit. The rationale for both Hypothesis 3 and Hypothesis 2 was that a high perception of competence or autonomy may shift the effect of a performance-approach goal from negative to positive. Therefore, as previously predicted in Hypothesis 2, for students with high competence or high autonomy, the adoption of a performance goal may have a positive effect on learning, while for students with low competence or low autonomy, the adoption of a performance goal may have a negative effect on learning. Based on this prediction of Hypothesis 2, it was, for

Hypothesis 3, expected that the moderating roles of perceived competence and autonomy would determine the most adaptive types of goal combinations. Therefore, for students who feel competent or autonomous, students with high mastery and high performance-approach goal orientations are predicted to show the most adaptive (the multiple-goal perspective) learning pattern. On the other hand, for students who feel incompetent, or controlled, concentration on the pursuit of a mastery goal (adopting the mastery goals without pursuing performance goals) is predicted to be the most adaptive approach.

<For Students with High Perceived Competence>

<For Students with Low Perceived Competence>
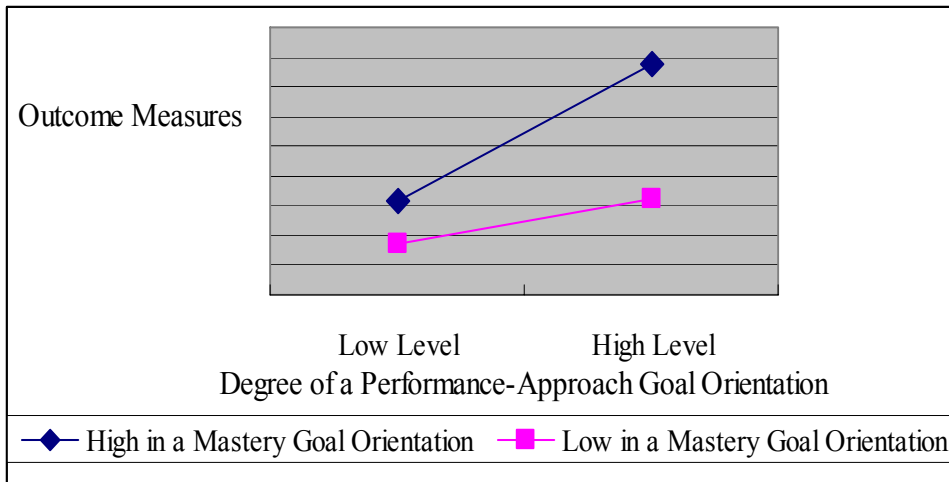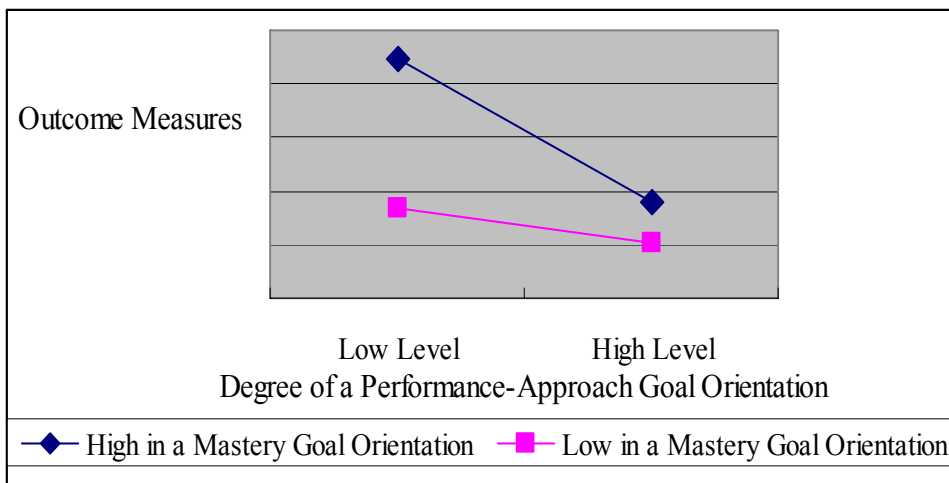
Figure 3. 4 The Hypothesized Three-Way Interaction Effects Among a Performance-Approach Goal Orientation, a Mastery Goal Orientation, and Perceived Competence (or Perceived Autonomy)
The first graph denotes a two-way interaction between a performance-approach goal and a mastery goal at LOW level of perceived competence (or perceived autonomy). The second graph denotes a two-way interaction between a performance-approach goal and a mastery goal at HIGH level of perceived competence (or perceived autonomy).   PA = Performance-Approach Goal Orientation.   Dependent Variables include the measures of Achievement, Adaptive Learning Strategy Use, Interest, and Effort; Independent Variables include the measures of Performance-Approach goal, Mastery goal, Perceived Competence (or Perceived Autonomy).

CHAPTER 4

METHODS

This chapter describes the design of the study and the research methods used to gather and analyze research data. The chapter first outlines the participants, measures, and procedures for data collection. Next, the chapter describes the methods used in the study for testing hypotheses and analyzing data. Lastly, a framework for interpreting and discussing main findings in relation to interaction effects is described.

Participants

The participants in this study were 164 college students enrolled in a statistics course at a large university in the Southwest United States. The students were asked to participate in the study with the approval of the university's Institutional Review Board, and the students earned course credit for their participation. The course, Introduction to Statistics, was a required course in the programs being pursued by upper-division undergraduate students; therefore, the majority of students were in their third and fourth years of college. Graduate students, however, were also allowed to take the course as part of their programs. For the measures of interest in this study, the characteristics and response patterns of graduate-student participants were expected to be different from those of undergraduates. To avoid the effects of those differences, this study disregarded data from the 13 graduate students in this sample. As a result, the final number of participants in the study was 151 students, which included 122 females and 29 males.

Measures

Four questionnaires were used to examine six variables: achievement goal orientations, perceived competence, perceived autonomy, adaptive learning strategy use, interest, and effort. First, the Achievement Goal Orientation Inventory was used to assess achievement goal orientation. Achievement goal orientation is defined as the set of purposes for one's engagement in a task. Second, the Pattern of Adaptive Learning Survey (PALS) was used to measure perceived competence and adaptive learning strategy use. Third, the Academic Self-Regulation Questionnaire (SRQ-A) was used to assess perceived autonomy. Perceived autonomy is defined as the extent to which students perceive themselves to be autonomous in their academic work. Finally, the Intrinsic Motivation Inventory (IMI) was used to assess student interest and effort. In addition, an academic achievement measure and a demographic information form were used. Each of the measures and their statistical characteristics are discussed in the following sections.

The Achievement Goal Orientation Inventory

The Achievement Goal Orientation Inventory (AGOI) was adapted from Elliot & Church's (1997) Achievement Goal Scale. To elicit students' domain-specific achievement goal orientation, particularly their goal orientation toward the statistics course, some wording on the scale was modified. For instance, "in this course" was replaced with "in this statistics course." The goal orientation scale used by Elliot and his colleagues in their classroom studies (Elliot & Church, 1997; Elliot & McGregor, 1999; Elliot, McGregor, & Gable, 1999) consists of three subscales: mastery goals,

performance-approach goals, and performance-avoidance goals, with six items in each subscale. The response to each item is indicated on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Students' ratings on each type of achievement goal were averaged to obtain the three achievement goal scores. Sample items from the mastery goal subscale included the item "I want to learn as much as possible from this statistics course." The performance-approach goal subscale included the item "It is important to me to do better than the other students in this statistics course," Finally, in the performance-avoidance goal subscale was the item "I worry about the possibility of getting a bad grade in this statistics course."

Elliot and Church (1997) reported that scores on the scale show an acceptable internal consistency for each of the three goal constructs; that is, the mastery, performance-approach, and performance-avoidance subscales yielded Cronbach's alphas of 89, .91, and .77, respectively. The data for the present study also gave evidence of acceptable reliability coefficients for the subscales. The Cronbach's alpha estimate for the scores of the items in the mastery, performance-approach, and performance-avoidance goal subscales were.84, .90, and .79, respectively (see Table 4.1).

As to the construct validity of the measure, a factor analysis was performed with the principal-axis factoring extraction method and oblimin rotation. Eigenvalues greater than 1 were used as a main criterion for a factor structure. A scree plot was also examined to decide the number of factors. The result of the factor analysis was a clear three-factor structure, indicating that distinct sets of items measured a mastery goal orientation, a performance-approach goal orientation, and a performance-

avoidance goal orientation, respectively. Factor loading cutoff criteria of .35 was used. Loadings for each factor ranged from .35 to .90, and most exceeded .50. The three factors accounted for a total of 53.16% of the item variance. The factor loadings for each goal orientation and factor correlation matrix are displayed in Appendix H.

Perceived Competence

The Pattern of Adaptive Learning Survey (PALS) (Midgley, Maehr, & Urdan, 1993) was adapted to measure perceived competence. The PALS was developed to measure students' motivational orientations and use of learning strategies. The survey comprises four subscales: motivational orientation, academic self-beliefs, adaptive/maladaptive learning strategies, and perception of how teachers, parents, and friends are oriented toward school. For the present study, seven items from the academic self-beliefs scale were included to assess perceived competence. The participants rated how much they agreed with statements regarding their competence (for example, "I can do almost all the work in this class if I don't give up") on a seven-point Likert scale, with 1 representing strong disagreement and 7 representing strong agreement. Then, the ratings were averaged to compute the perceived competence score.

The psychometric properties of this measure were found to be satisfactory. The Cronbach's alpha estimate for the scores of the items in the scale was .83 (Table 4.1). As for the construct validity analysis, a 1-factor model was found in which all of the seven items loaded properly on a perceived competence factor. The one-factor structure was decided because only one factor emerged with its eigenvalue greater

than 1. The model accounted for a total of 48.02% of the variance. Factor loadings are displayed in Appendix I.

Perceived Autonomy

Students' perceived autonomy was assessed using the Academic Self-Regulation Questionnaire (ARSQ; Ryan & Connell, 1989). The ASRQ, which was designed primarily for students in late elementary or middle schools, was adapted to measure the degree to which college students are autonomous toward their task involvement. Wording was revised to be more appropriate for college students and their learning environments; for example, "the teacher" was replaced with "the instructor."

The measure consists of four subscales that assess the extent to which the students' reasons for task involvement are indicative of autonomous motivation. The subscales represent External, Introjected, Identified, and Intrinsic forms of Regulation.

Students rated each subscale by answering items about why they performed class activities (for example, "Why do I do my assignment?"). They responded to each item by indicating their answer on a scale ranging from 1 (strongly disagree) to 7 (strongly agree). The nine-item External Regulation Scale ($\alpha = .78$) taps into reasons that imply pressure from sources external to the student (for example, "Because I'll get in trouble if I don't"). The nine-item Introjected Regulation Scale ($\alpha = .75$) taps into reasons that are internalized but nevertheless are derived from external circumstances and so still represent pressure from the outside (for example, "Because I'll feel bad about myself if I don't do it"). The seven-item Identified Regulation

Scale ($\alpha = .61$) taps into reasons that are internalized into the value system of the student and so are choiceful and unpressured (for example, "Because I want to learn new things"). The seven-item Intrinsic Regulation Scale ($\alpha = .85$) taps into reasons of pure fun and enjoyment (for example, "Because it's fun").

The four different types of regulation represent different degrees of autonomy. According to Ryan and Connell (1989), the four types of regulation display a quasi-simplex structure in relation to each other, where variables show ordered correlation patterns reflecting an underlying continuum of relative autonomy. The interrelations among the subscales for the sample of this study support this conceptual structure[4] (Appendix K).

An exploratory factor analysis was performed to assess the construct validity of the modified version of the ASRQ. Using all 32 items, the factor analysis was conducted using the principal axis factoring extraction method and oblimin rotation method. A few items, however, did not load on the intended subscale factor. For each of those items, after examining its content, the investigator made a decision about excluding or retaining it.

For example, two items on the External Regulation Subscale, Item 9 ("So that

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[4] Interrelations among the four subscales show that the four subscales are all positively related to each other to a significant degree at $p < .01$. but the magnitudes of the correlation are greater between two subscales next each other. According to the literature, the External Regulation and Introjected Regulation Subscales represent controlled types of motivation while the Identified and Intrinsic Regulation Subscales represent autonomous types of motivation. The correlation matrix with subtraction scores, which were computed by substracting an average score of perceived autonomy scale from the average scores of each subscale, support this conceptually opposite types of motivation.

the instructor won't be disappointed with me") and Item 24 ("Because I want the instructor to say nice things about me") did not load on the External Regulation Subscale, but it did load on the Introjected Regulation Subscale. The examination of their contents indicated that Item 9 and Item 24 did not seem to fit conceptually with the other items in the External Regulation Subscale. Instead, they were phrased more similarly to items in the Introjected Regulation Subscale. An example is "Because I want the instructor to think I'm a good student". For that reason, the two items were excluded from the External Regulation Subscale, leaving the seven remaining items for the data analysis for that subscale. In addition, Item 21 on the Identified Regulation Subscale did not load on the corresponding subscale but loaded on the Introjected Regulation Subscale. Item 21, "To find out if I'm right or wrong," was not stated properly to reflect the construct of Identified Regulation, so it too was excluded, leaving six items in that subscale for the data analysis.

After excluding three items, the factor analysis was rerun, and the results revealed a four-factor structure that was well aligned with the External, Introjected, Identified, and Intrinsic Regulation Subscales. This model accounted for 57.50% of the total variance. All items for each subscale loaded as expected on their relevant factors, with the exception of the items for the Introjected Regulation Subscale. Some items from the Introjected Regulation Subscale (for example, "Because I'll be ashamed of myself if it didn't get done") loaded on the Identified Regulation Subscale, but they were not excluded in the data analysis because the items seemed to fit conceptually with the other items for the Introjected Regulation Subscale. Factor loadings and factor correlation matrix are displayed in Appendix J.

To obtain a perceived autonomy score, the mean score of each of the four subscales was generated by averaging the item scores of the subscale. According to Ryan and Connell's (1989) formulations for an index of relative autonomy, the four scales were weighted according to their relative degree of autonomy (-2, -1, +1, and +2, for External, Introjected, Identified, and Intrinsic Regulation, respectively), and then the weighted scores were summed. The following formula was used to compute the perceived autonomy.

Perceived Autonomy Score = 2(Intrinsic Regulation) + (Identified Regulation) – (Introjected Regulation) – 2(External Regulation)

Higher scores of perceived autonomy indicate greater degrees of autonomy in initiating learning activities. Because a composite score for perceived autonomy was used in the data analysis, instead of scores for each subscale, reliability and factor analysis tests were conducted to ensure that the perceived autonomy scale had adequate psychometric properties. Thus, the Cronbach's alpha estimate for scores of the four subscales of the perceived autonomy scale was .75 (Table 4.1). As for the construct validity of the perceived autonomy scale, a factor analysis was performed using the principal axis factoring extraction method. Instead of the individual items of each subscale, the four scales (External, Introjected, Identified, and Intrinsic Regulation) were entered as units of analysis. As predicted, a one-factor structure was found with the eigenvalue of the factor greater than 1. The factor loadings are displayed in Appendix K.

Adaptive Learning Strategies

The Pattern of Adaptive Learning Survey (PALS) (Midgley, Maehr, & Urdan, 1993) was used to measure adaptive learning strategies. The adaptive learning strategy subscale among the four subscales of the PALS was used. This subscale consisted of 10 items, for which the students indicated their responses on seven-point Likert scales, where 1 represented strong disagreement and 7 represented strong agreement. An example of the items is "I ask myself questions when I work on my study, to make sure I understand."

In Kaplan and Midgley's (1997) study, scores on the scales for adaptive learning strategies were revealed to be reliable ($\alpha \geq .74$). In other studies, scores on this measure have shown both good internal consistency and good construct validity (for example, Midgley, Anderman, & Hicks, 1995; Midgley, Kaplan, Middleton, Urdan, Hicks, & Roeser, 1996; Midgley & Urdan, 1995).

Among the psychometric properties of the measure, the alpha coefficient for scores on these measure was .69 (Table 4.1), and the construct validity of the measure demonstrated a one-factor structure, where the eigenvalue of the factor was greater than 1 and all of the items loaded properly on their factor. Despite the clear factor structure, only 27.35% of the total variance was explained by the factor. Factor loadings are displayed in Appendix L.

Student Interest

Student interest was assessed by using a self-report measure called the Intrinsic Motivation Inventory (IMI) (Ryan, 1982). The IMI consists of seven

subscales: Interest/Enjoyment, Effort/Importance, Perceived Competence,

Value/Usefulness, Felt Pressure and Tension, Perceived Choice, and

Experience/Relatedness. According to Ryan and his colleagues, the selective use of

items from the IMI does not significantly affect the psychometric properties of the

measure. Thus, the Interest/Enjoyment subscale, among the seven subscales, was used

to measure interest, which in turn comprised seven items. Examples of these items

include "This class work was fun to do" and "I enjoyed doing this class work very

much." The participants rated how much they were interested in doing work in their

statistics class on a 7-point Likert scale ranging from 1 (not at all true) to 7 (very true).

The Cronbach's alpha estimate for the scores of the items in the interest scale was .94

(Table 4.1). A factor analysis conducted to examine psychometric properties of the

interest scale yielded a one-factor structure with the eigenvalue of the factor greater

than 1 and with all the items loading on the intended scale (Appendix M).

Effort

The Effort/Importance subscale of Ryan's (1982) Intrinsic Motivation

Inventory (IMI) was used to assess how much effort the college students expended on

studying and learning. The subscale included five items, which were each scored on a

seven-point Likert scale with 1 being "not at all true" and 5 being "very true." Among

the five items, four items assessed the expenditure of effort (for example, "I put a lot

of effort into this class work" and "I tried very hard on this class work"), and only one

item assessed the importance of the effort ("It was important to me to do well at this

class work"). In the present study, only the four items assessing the amount of effort

were used.

Psychometric properties were found to be favorable for the expenditure of the effort scale in the present study. The Cronbach's alpha for the sample in the study was .87 (Table 4.1). The construct validity analysis demonstrated a 1-factor structure, where all of the five items loaded properly on the factor (Appendix N). The model accounted for a total of 68% of the item variance.

Academic Achievement (Final Course Grade)

The final course grades were used to assess academic achievement. At the end of semester, three instructors provided the grades in the form of percentile scores ranging from 0 to 100. Because the three instructors might have used different scoring standards, some variance was expected between classes. The final course grades were transformed into standardized scores to reduce error variances, and those standardized scores were used for the data analysis.

Procedure

The set of questionnaires was administered at mid-semester, when students were likely to have settled into particular types of achievement goal orientations. The participants were asked to complete questionnaires designed to assess their goal orientations, perceptions of autonomy, intrinsic motivation, adaptive/maladaptive patterns of learning strategies, and perceived competence. To avoid any carryover effect, participants were randomly assigned to three groups. The members of each group were given sets of measures, but from group to group the order of the measures

was different. The order of the measures for each group was randomly chosen. The first group of students received measures in the following order: the Achievement Goal Orientation Inventory (AGOI), the Pattern of Adaptive Learning Survey (PALS), the Self-Regulation Questionnaire (ARSQ), and the Intrinsic Motivation Inventory (IMI). The order for the second group was the PALS, IMI, AGOI, and ARSQ; and the order for the third group was the ARSQ, IMI, PALS, and AGOI.

Table 4. 1　Summary of the Cronbach Alphas for the Scores on Key Measures

Name of Measures	Cronbach α	Scale	# of Items
Achievement Goal Orientations			
Mastery Goals	.84	7-Point Likert Scale	6
Performance-approach Goals	.90	7-Point Likert Scale	6
Performance-Avoidance Goals	.79	7-Point Likert Scale	6
Perceived Competence	.83	7-Point Likert Scale	7
Perceived Autonomy	.75		29
External Regulation	.81	7-Point Likert Scale	7
Introjected Regulation	.87	7-Point Likert Scale	9
Identified Regulation	.78	7-Point Likert Scale	6
Intrinsic Regulation	.91	7-Point Likert Scale	7
Adaptive learning strategy use	.69	7-Point Likert Scale	6
Interest	.94	7-Point Likert Scale	7
Effort	.87	7-Point Likert Scale	4

Hypotheses and Data Analyses

Hypothesis 1

It was hypothesized that some differences exist among the three different types of goal orientations in terms of their relationships to perceived competence and perceived autonomy.

Hypothesis 1(a)

It was hypothesized that a mastery goal and a performance-approach goal are positively associated with perceived competence, while a performance-avoidance goal is negatively associated with perceived competence.

Hypothesis 1(b)

It was hypothesized that a mastery goal is positively related to perceived autonomy and a performance-avoidance goal is negatively related to perceived autonomy. On the other hand, a performance-approach goal is hypothesized to be unrelated to perceived autonomy.

Statistical Analysis for Hypothesis 1(a) and 1(b): This hypothesis was tested using Pearson correlation. Students' achievement goal orientation scores were correlated with perceived competence and autonomy scores. The significance test for Pearson's correlation coefficients was conducted and the critical value for the test of

significance of the correlation was $p < .05$.

Hypothesis 2

It was hypothesized that two psychological characteristics—perceived competence and autonomy—play roles as moderators of the relationship between the degree of single goal orientation and outcome measures.

Hypothesis 2(a)

Perceived competence was predicted to function as a moderator of the relationship between achievement goal orientations and various learning- or achievement-related variables (achievement, adaptive learning strategies, task interest, and effort).

Statistical Analysis for Hypothesis 2(a): To test Hypothesis 2a, a series of analysis of variances (ANOVAs) was conducted. The model of the ANOVAs was customized to exclude unnecessary interaction-effect terms from the default ANOVA model of SPSS, which includes main effects for all independent variables and interaction terms for all possible combinations of the independent variables. Given that the main focus of the present study was on the interaction effects between the degree of single-goal pursuits and perceived competence and on the interaction effects between multiple-goal pursuits (adopting both a mastery goal and a performance-approach goal) and perceived competence, the customized ANOVA model included the following:

- Four main effect terms (dichotomized mastery, performance-approach, performance-avoidance goals, and perceived competence),

- Three two-way interaction terms (mastery goal x perceived competence, performance-approach goal x perceived competence, performance-avoidance goal x perceived competence)

- A three-way interaction term (mastery x performance-approach goal x perceived competence)[5]

Academic achievement, adaptive learning strategies, interest, and effort were examined as dependent variables for each ANOVA. The Bonferroni adjustment was used so that the conventional level of α of .05 was divided by four ($p < .013$), which is the number of dependent variables used in the present study.

To dichotomize continuous variables, the median split method was used. The continuous variables of each type of achievement goal orientation and perceived competence were transformed into dichotomous variables. This artificial dichotomization may lead to the loss of data information. Accordingly, in the case where continuous independent variables need to be dichotomized, the use of ANOVA as a statistical method has the disadvantage of reducing statistical power, compared to the regression analysis where independent variables are used as continuous. Despite

[5] Besides the three-way interaction (among a mastery, a performance-approach goal and perceived competence) that was included in the ANOVA model, the other 3 possible interaction terms includes the following: 1) mastery x performance approach x performance avoidance goal, 2) mastery x performance avoidance goal x perceived competence, 3) performance approach x performance avoidance goal x perceived competence. The focus of the present study is to examine whether the effect of a performance approach goal is, in the context of a mastery goal orientation, dependent on the level of perceived competence.

the disadvantage, ANOVA was employed in the present study because it has the advantage that it allows for group mean comparisons (Midgley, Kaplan, & Middleton, 2001), which enhance the convenience of the interpretation for two-way and three-way interaction effects.

The continuous measures of a mastery goal, a performance-approach goal, a performance-avoidance goal, and perceived competence, were divided into low- and high-level groups at the median of 4.67, 4.5, 4.83, 5, and -1.14, respectively. A group with score values lower than a median score of a given variable was coded as 1, and a group with higher score values than a median score of a given variable was coded as 2.

Table 4. 2   ANOVA Model for Perceived Competence as a Moderator

Main effect	• Mastery goal
	• Performance-Approach goal
	• Performance-Avoidance goal
	• *Perceived Competence*
Two-way Interaction	• Mastery x *Perceived Competence*
	• Performance-Approach x *Perceived Competence*
	• Performance-Avoidance x *Perceived Competence*
Three-way Interaction	• Mastery x Performance-Approach x *Perceived Competence*

Hypothesis 2(b)

Perceived autonomy was predicted to function as a moderator of the relationships between achievement goals and various learning- or achievement-related variables (achievement, adaptive learning strategies, task interest, and effort).

More specifically, it was hypothesized that perceived autonomy would moderate the effects of mastery goals. In other words, a strong perception of autonomy would strengthen the positive relationship between mastery goals and learning- or achievement-related variables (achievement, use of adaptive learning strategies, task interest, and effort).

It was hypothesized that perceived autonomy would moderate the effects of performance-approach goals on learning- or achievement-related variables (achievement, adaptive learning strategy use, interest, effort). The relationship between performance-approach goals and achievement-related variables would differ depending on the level of perceived autonomy.

It was also hypothesized that perceived autonomy would moderate the *strength* of the effects of performance-avoidance goals. In other words, a strong perception of autonomy would reduce the negative relationship between performance-avoidance goals and adaptive learning outcomes (achievement, adaptive learning strategy use, interest, effort).

Statistical Analysis for Hypothesis 2(b): Hypothesis 2b was tested using a series of analyses of variance[6] (ANOVAs). Similar to the perceived competence ANOVA model, the perceived autonomy ANOVA model was customized in order to exclude interaction terms that were not a focus of this study. Given that the main focus of the present study was on the interaction effects between each specific type of single-goal pursuit and perceived autonomy and on the interaction effects between multiple-goal pursuits of a mastery goal and performance-approach goal and perceived autonomy, the customized ANOVA model included the following:

- Four main-effect terms (dichotomized mastery, performance-approach, performance-avoidance goals, and perceived autonomy)

- Three two-way interaction terms (mastery goal x perceived autonomy, performance-approach goal x perceived autonomy, performance-avoidance goal x perceived autonomy),

- A three-way interaction term (mastery x performance-approach goal x perceived autonomy)

Academic achievement, adaptive learning strategies, interest, and effort were examined as dependent variables for each ANOVA, respectively. The Bonferroni

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[6] An analysis of covariance (ANCOVA) where perceived competence was controlled for was originally proposed to test hypothesis 2b. The assumptions of ANCOVA were tested before conducting ANCOVA but the assumption of homogeneity of regression was found to be violated. There was a significant interaction effect between perceived competence (covariate) and a mastery goal (independent variable), indicating that the regression slopes that represent the effect of perceived competence on dependent variables differ depending on the level of a mastery goal. As a result, ANOVA was performed instead of ANCOVA.

adjustment was used to account for the multiple tests. The conventional level of α

of .05 was divided by the number of dependent variables used in the present study (p

< .013).

The median-split method, which is a common method used to transform

continuous variables into dichotomized level of groups, was used to divide the

continuous variables of mastery, performance-approach, performance-avoidance goals,

and perceived autonomy into high- and low-value groups (for example, a group with

low mastery goal orientation and a group with high mastery goal orientation). A group

with lower values than the median score of each variable was coded as 1, and a group

with higher values of than the median score of each variable was coded as 2.

For the follow-up analyses, in the presence of a significant interaction effect,

a simple main effect analysis was performed to determine at which level of the

moderator variable an independent variable has a significant effect on the outcome

measures.

Table 4. 3   ANOVA Model for Perceived Autonomy as a Moderator

Main effect	• Mastery goal • Performance-Approach goal • Performance-Avoidance goal • *Perceived Autonomy*
Two-way Interaction	• Mastery x *Perceived Autonomy* • Performance-Approach x *Perceived Autonomy* • Performance-Avoidance x *Perceived Autonomy*
Three-way Interaction	• Mastery x Performance-Approach x *Perceived Autonomy*

Hypothesis 3

It was hypothesized that perceived competence and autonomy moderate the effects of multiple goal orientations on outcome measures (achievement, adaptive learning strategies, interest, and effort).

Hypothesis 3(a)

Among the students high in perceived competence, those adopting both a mastery goal and a performance-approach goal were predicted to show the most adaptive patterns of learning and achievement. On the other hand, of the students low in perceived competence, those who predominantly pursue a mastery goal (without adopting a performance-approach goal) will show the most adaptive pattern of motivation.

Hypothesis 3(b)

Among the students high in perceived autonomy, those who pursue both a mastery goal and a performance-approach goal were predicted to show the most adaptive pattern of learning and achievement. On the other hand, among students low in perceived autonomy, those who dominantly pursue a mastery goal (without adopting a performance-approach goal) will show the most adaptive pattern of motivation.

Statistical Analysis for Hypothesis 3(a) and 3(b): To test Hypothesis 3a and 3b, an analysis of variance (ANOVA) was performed to investigate whether there was an interaction effect between perceived autonomy and multiple-goal pursuits. The ANOVA allows us to compare groups with various combinations of multiple-goal pursuits, but it has the disadvantage of losing much information and statistical power because of the dichotomization of continuous variables (Midgley, Kaplan, & Middleton, 2001). The median-split method was used to divide the continuous variables of mastery, performance-approach, and performance-avoidance goals into high and low groups (for example, a low mastery group and a high mastery group). The customized model of ANOVA contained four main effect terms (a mastery, a performance-approach goal, a performance-avoidance goal, perceived autonomy) and three-way interaction terms (a mastery goal x a performance-approach goal x perceived autonomy). For the follow-up analyses, in the presence of a significant interaction effect, a simple main effect analysis was performed to examine at which level of the moderator variable an independent variable has a significant effect on outcome measures.

All the data analyses in the present study were computed using SPSS (Statistical

Package for Social Sciences) Version 11.0.

A Framework for Data Analyses and Discussion: *Different Patterns of Interaction and Different Roles of a Moderator*

This section describes diverse patterns of interactions that provide a framework for interpreting and discussing findings in respect to moderators. The main purpose of this study was to examine the moderating roles of perceived competence and perceived autonomy in the effects of achievement goal orientations. As previously discussed, ANOVAs will be used to detect interaction effects between perceived competence/autonomy and achievement goal orientations. Whether perceived competence (or perceived autonomy) moderates the effect of achievement goal orientations is indicated by the presence of a significant interaction effect between perceived competence and achievement goal orientations. Interaction effects, however, have various patterns, and their nature depends on whether significant main effects are present.

As discussed in the literature review, Harackiewicz et al. (2002) identified four categories of achievement goal effects. One of the categories is an interactive goal pattern, which means that there is a two-way interaction between two achievement goals, a mastery goal and a performance-approach goal. The authors, however, do not delineate the various patterns of interaction in detail. The presence of an interaction effect signals that one independent variable moderates the effect of the other independent variable. For us to better understand the different patterns of interaction, however, the roles of a moderator should be clear.

A "pure" two-way interaction effect occurs when there is no main effect for either independent variable (Table 4.4). In this case, neither independent variable is related to the outcome measure, and thus the effect of one independent variable is completely dependent on the other independent variable and vice versa. The presence of interaction, however, does not always mean that there is no significant main effect of independent variables. Rather, the interaction effects involve various patterns of interaction, as well as the pure type of interaction. A two-way interaction effect, for example, can occur when two significant main effects are present, one for each independent variable (Table 4.4), in which case the pattern is a combination of additive and interaction effects. Two independent variables have an additive effect because each independent variable contributes its own main effect. Consequently, the combination of the two main effects results in a higher outcome measure than only one main effect can provide. Besides being additive, the effects of two independent variables may also be interactive. An interaction between the two variables means that the magnitude of the main effect for one independent variable on an outcome measure is greater in the presence of the other variable, and as a result, the total effect on the outcome measure is greater than the simple sum of the effects of the two independent variables taken separately. In other words, the two independent variables work together synergistically[7] to magnify their effects—positively or negatively—on the

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[7] An additive effect occurs when two main effects are found to be significant, but no significant interaction effect exists. In this case, the main effects of the two independent variables are added, resulting in higher scores on outcome measure than having only one significant main effect. However, the degree of increase in scores on the outcome measures does not go beyond the addition of the two main effects because the presence of two main effects increases scores on an outcome measure to a consistent additive degree.

outcome measure.

Another pattern of a two-way interaction involves an interaction in which the main effect of one independent variable is significant and the main effect of the other independent variable is not significant (Table 4.4). In this pattern of interaction, the two independent variables have differential influence on the effect of each independent variable on dependent variable. The independent variable that has a significant main effect may have a consistent direction (positive or negative) in its relationship with the outcome measure across the values of the other independent variable, but the magnitude of the relationship varies at higher or lower values of the independent variable. Conversely, the independent variable without a significant main effect may reverse its relationship (from positive to negative or vice versa) with the outcome measure as the value of the other independent variable increases or decreases.

Awareness of these different patterns of interaction is important to the interpretation of the effects of multiple-goal pursuit. An interaction effect in the absence or in the presence of a significant main effect not only helps us better understand the roles of a moderator, but it also helps us discover what determines the effects of an achievement goal orientation and what maximizes the positive outcome of a particular type of goal orientation.

Table 4. 4 Various Patterns of Interaction

	1	2	3	4
A (Mastery goal)	X	○	○	X
B (Performance goal)	X	○	X	○
A x B (Interaction Effect)	○	○	○	○

Note. A x B denotes an interaction effect between a mastery goal and a performance-approach goal

1 = Pure interaction effect without any main effect of independent variables

2 = Interaction effect with main effects for both independent variables present

3 and 4 = Interaction effect with main effect for one of the independent variables

CHAPTER 5

RESULTS

This chapter outlines the findings from the data analyses. Those findings include descriptive statistics of the major variables and the correlations between them. In addition, the chapter relates the findings to each of the research hypotheses of the study.

Preliminary Analysis

A test for a carryover effect was conducted to see whether there was a significant difference among the three groups of students who were given sets of questionnaires in which items were presented in different order. No significant difference in any of measures was found, indicating that the order of items did not have a significant impact on the participants' scoring. Therefore, they were combined in subsequent analyses.

The means and standard deviations for the key variables of the study are presented in Table 5.1, and zero-order intercorrelations among major variables in the present study are displayed in Table 5.2.

Table 5. 1   Means and Standard Deviations for Major Measures

	M	(*SD*)	Possible Range
Achievement Goal Orientations			
Mastery Goals	4.54	(1.17)	0−7
Performance-Approach Goals	4.33	(1.44)	0−7
Performance-Avoidance Goals	4.59	(1.32)	0−7
Perceived Competence	4.92	(1.19)	0−7
Perceived autonomy (RAI)	-.91	(3.80)	-19−19
External Regulation	3.87	(1.31)	0−7
Introjected Regulation	4.05	(1.21)	0−7
Identified Regulation	5.03	(1.04)	0−7
Intrinsic Regulation	2.93	(1.31)	0−7
Dependent Variables			
Achievement	81.88	(13.97)	0−100
Adaptive learning strategy use	4.46	(1.01)	0−7
Task Interest	2.96	(1.47)	0−7
Effort	4.61	(1.26)	0−7

Table 5. 2   Correlation Matrix for Major Variables in the Present Study

	1	2	3	4	5	6	7	8	9
1. Mastery	___								
2. Perfor-Appro	.29**	___							
3. Perfor-Avoid	-.22**	.03	___						
4. Competence	.39**	.31**	-.54**	___					
5. Autonomy	.37**	-.19*	-.42**	.34**	___				
6. Achievement	.28**	.36**	-.31**	.38**	.08	___			
7. Adaptive LS	.53**	.24**	-.15	.41**	.22**	.17	___		
8. Interest	.59**	.24**	-.35**	.48**	.47**	.34**	.45**	___	
9. Effort	.36**	.14	.06	.15	.15	.20*	.32**	.34**	___

Note. Perfor-Appro = a Performance-Approach Goal, Perfor-Avoid = a Performance-Avoidance Goal, Competence = Perceived Competence, Autonomy = Perceived Autonomy, Adaptive LS = Adaptive Learning Strategy Use

*p < .05. **p < .01.

Relationships Between Achievement Goal Orientations and Perceived

Competence/Perceived Autonomy

Hypothesis 1

It was hypothesized that some differences exist among the three different

types of goal orientations in terms of their relationships to perceived competence and

perceived autonomy.

Hypothesis 1(a)

It was hypothesized that a mastery goal and a performance-approach goal are

positively associated with perceived competence, while a performance-avoidance goal

is negatively associated with perceived competence.

Hypothesis 1(b)

It was hypothesized that a mastery goal is positively related to perceived autonomy

and a performance-avoidance goal is negatively related to perceived autonomy. On

the other hand, a performance-approach goal is hypothesized to be unrelated to

perceived autonomy.

Results: A Pearson correlation analysis was conducted to test Hypotheses 1a

and 1b. The significance test for correlation coefficients was conducted and the

critical value for the test of significance of the correlation was $p < .05$.

Consistent with the hypothesis, the results showed that a mastery goal had a

significant positive relationship with both perceived competence and perceived autonomy, $r = .39$ and $r = .37$, respectively (Table 5.3). A performance-avoidance goal, as predicted, revealed a significant negative relationship with both perceived competence, $r = -.54$, $p < .01$ and perceived autonomy, $r = -.42$, $p < .01$ (Table 5.3). On the other hand, a performance-approach goal demonstrated a differential relationship with perceived competence, $r = .31$, $p < .01$ and perceived autonomy, $r = -.19$, $p < .01$ (Table 5.3). As hypothesized, a performance-approach goal was positively linked to perceived competence. Regarding the relationship between a performance-approach goal and perceived autonomy, it was hypothesized that a performance-approach goal had no relationship with perceived autonomy. The performance-approach goal, however, yielded results contrary to the hypothesis in that it was negatively linked to perceived autonomy. In sum, a mastery goal displayed a positive direction of relationship with both perceived competence and perceived autonomy, while the performance-avoidance goal exhibited an opposite, negative direction of relationship with perceived competence and autonomy. Unlike the mastery goal and the performance-avoidance goal showing uniform direction of relationship, positively and negatively, respectively, a performance-approach goal was positively related to perceived competence but it was negatively related to perceived autonomy.

Table 5. 3   Correlation Matrix Between Achievement Goal Orientations and Perceived Competence and Autonomy

	Mastery goal	Performance -Approach	Performance -Avoidance
Perceived Competence	.39 **	.31**	-.54**
Perceived Autonomy	.37**	-.19*	-.42**

$*p < .05$, 2-tailed. $**p < .01$, 2-tailed.

Perceived Competence and Perceived Autonomy as Moderators of the Effect of a Single Goal Pursuit

Hypothesis 2

It was hypothesized that two psychological characteristics, perceived competence and autonomy, play roles as moderators of the relationship between specific types of single-goal orientation and outcome measures.

Hypothesis 2(a)

Perceived competence was predicted to function as a moderator of the relationship between achievement goal orientations and various learning- or achievement-related variables (achievement, adaptive learning strategies, task interest, and effort).

To test Hypothesis 2a, a series of ANOVAs was conducted to examine whether perceived competence plays a role as moderator of the relationship between the degree of each achievement goal orientation and learning-related outcome measures (achievement, adaptive learning strategy use, interest, and effort). The

presence of two-way interaction effects between achievement goal orientations and perceived competence indicates that perceived competence moderates the effects of single-goal pursuits (the effect of a mastery goal, a performance-approach goal, and a performance-avoidance goal).

A two-way interaction effect between a mastery goal and perceived competence was found to be significant, $F (1, 141) = 9.56, p < .013^8, \eta^2 = .06$, on adaptive learning strategy use (Table 5.4). In the presence of a significant two-way interaction, a simple main effect analysis was performed to further understand at what levels of perceived competence a mastery goal has a significant effect. The findings of this main effect analysis suggested that the effect of a mastery goal on adaptive learning strategy use was stronger for students who felt competent than for students who felt incompetent (See Figure 5.1 and Table 5.6). Specifically, a mastery goal showed a significant positive effect on adaptive learning strategy use for students who scored high in perceived competence, $F(1, 141) = 18.89, p < .013, \eta^2 = .12$. In contrast, a mastery goal did not make a significant difference in adaptive learning strategy use for students who scored low in perceived competence, $F (1, 141) = 1.41, p = .24, \eta^2 = .01$, though there was a pattern of positive relationships between a mastery goal and adaptive learning strategy use (Table 5.4).

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[8] The Bonferroni adjustment was used to account for the multiple tests. The critical value of .013 was used for the test of significance because an α of .5 was divided by 4 (# of dependent variables in the present study).
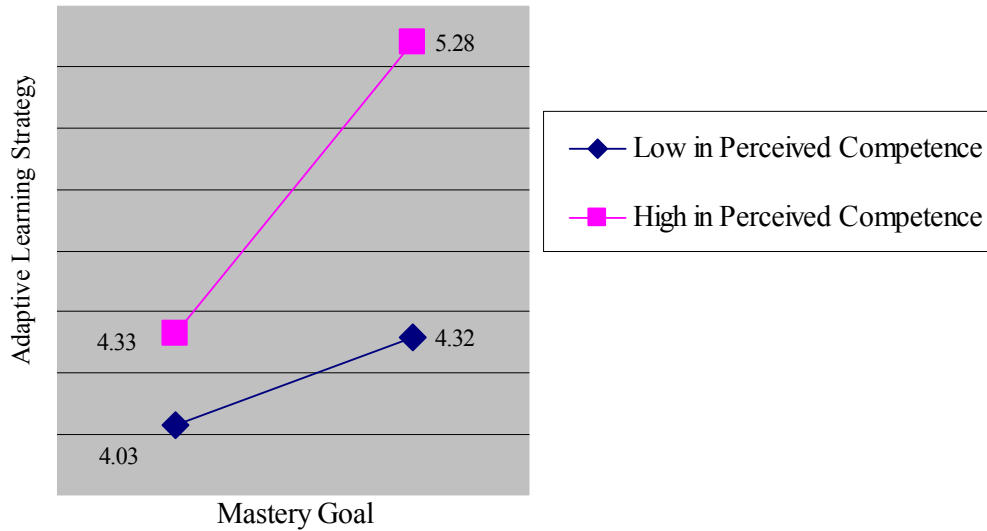
Figure 5. 1   The Interaction Effect Between a Mastery Goal and Perceived
Competence on Adaptive Learning Strategy Use

There was also a main effect of a mastery goal and a main effect of perceived competence on adaptive learning strategy use, $F (1, 141) = 14.30, p < .013, \eta^2 = .09$, and $F (1, 141) = 14.36, p < .013, \eta^2 = .09$, respectively (Table 5.4). This finding indicated that both a mastery goal and perceived competence had their own independent ability to predict adaptive learning strategy use. As shown in Table 5.6, a high level of mastery goal led to a higher level of adaptive learning strategy use ($M = 4.80, SD = .12$) than a low level of mastery goal ($M = 4.18, SD = .11$), regardless of perceived competence. Similarly, a high level of perceived competence led to a higher level of adaptive learning strategy use ($M = 4.81, SD = .12$) than a low level of perceived competence ($M = 4.18, SD = .12$), regardless of a mastery goal (Table 5.6).

As shown in Figure 5.1, the presence of the significant interaction effects of a mastery goal and perceived competence, with two main effects being significant, suggested that the independent positive impact of a mastery goal orientation on adaptive learning strategy use is magnified when the adoption of a mastery goal orientation is paired with high perceived competence. This pairing, moreover, led to the highest level of adaptive learning strategy use ($M = 5.28$, $SD = .16$) and the amount of increases in adaptive learning strategy use related to the pairing was greater than just simple addition of two main effects of a mastery goal orientation and perceived competence. Accordingly, a high level of a mastery goal orientation and a high level of perceived competence had a synergic effect on increasing adaptive learning strategy use.

Except for the outcome measure of adaptive learning strategy use, no significant two-way interaction effect between achievement goals and perceived competence was found on any of the other outcome measures (Table 5.4). For the outcome measure of achievement, however, perceived competence did not directly interact with either a mastery goal or a performance-approach goal, but it moderated the interaction pattern of a mastery goal and a performance-approach goal[9].

For the outcome measure interest, there were two main effects of a mastery goal orientation and perceived competence, exhibiting an additive effect without interacting with each other. The absence of an interaction between a mastery goal and

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[9] A three-way interaction effect among a mastery goal, a performance-approach goal, and perceived competence was found to be significant on the outcome measure of achievement. Results for the three-way interaction are presented later in the section about Hypothesis 3.

perceived competence indicates that the positive effect of a mastery goal and the positive effect of perceived competence generated an additive effect. Therefore, students who reported high scores in both a mastery goal orientation and perceived competence had higher levels of interest than did students who reported high scores in one of these variables and low in the other. The two main effects without an interaction effect, however, indicate that the amount of increased interest did not go beyond a simple addition of the two positive effects.

A mastery goal orientation was the only variable significantly related to effort, and no interaction was observed between achievement goal orientation and perceived competence for the outcome measure of effort.

Table 5. 4   ANOVA Results Summary for **Perceived Competence** as a Moderator

Variables	Achievement		Adaptive LS		Interest		Effort	
	F	η^2	F	η^2	F	η^2	F	η^2
M	.05	.00	14.30**	.09	26.21**	.09	6.77**	.05
PA	7.15**	.07	1.62	.01	.30	.01	.21	.00
PV	1.54	.02	1.6	.01	3.28	.01	2.60	.02
COM	1.62	.02	14.36**	.09	14.26**	.09	.54	.00
M x COM	.08	.00	9.56**	.06	.09	.03	1.49	.01
PA x COM	.01	.00	.16	.00	2.98	.00	.01	.00
PV x COM	1.29	.01	.49	.00	.16	.00	.08	.00
M x PA x COM	5.95**	.12	.31	.00	.49	.00	2.23	.03

Note. M = Main Effect for a Mastery goal orientation, PA = Main Effect for a Performance-Approach Goal, PV = Main Effect for a Performance-Avoidance Goal, AUT = Main Effect for Perceived Autonomy, M x AUT = Two-Way Interaction Effect Between a Mastery Goal Orientation and Perceived Competence, PA x AUT = Two-Way Interaction Effect Between a Performance-Approach Goal and Perceived Competence, PV x AUT = Two-Way Interaction Effect Between a Performance-Avoidance Goal and Perceived Competence, M x PA x AUT = Three-Way Interaction Effect Among a Mastery Goal, a Performance-Approach Goal, and Perceived Competence

$*p < .05. **p < .013$[10].

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[10] The Bonferroni adjustment was used to account for the multiple tests. The critical value of $p < .013$ was used for the test of significance because an α of .5 was divided by 4 (# of dependent variables).

Table 5. 5   Means and Standard Deviations for Two-Way Interactions Between a Performance-Approach Goal and Perceived Competence

Perceived Competence	Performance-Approach Goal					
	Low			High		
	n	*M*	(*SD*)	*n*	*M*	(*SD*)
Adaptive Learning Strategy Use						
High	29	4.74	(.17)	45	4.88	(.14)
Low	47	4.04	(.17)	30	4.31	(.16)
Interest						
High	29	3.03	(.24)	45	3.54	(.20)
Low	47	2.94	(.24)	30	2.68	(.23)
Effort						
High	29	4.72	(.24)	45	4.85	(.20)
Low	47	4.58	(.24)	30	4.66	(.22)

Note. No significant two-way interaction was found for a performance-approach goal. Means and standard deviation for two-way interactions (between a performance-approach goal and perceived competence) are presented in this table only for the outcome measure for which three-way interactions were not observed. Results for outcome measure of achievement are not presented in this Table because a significant three-way interaction (among a mastery goal, performance-approach goal, and perceived competence) was found (See Table 5.12).

Table 5. 6   Means and Standard Deviation for Two-Way Interactions Between a
Mastery Goal Orientation and Perceived Competence

Perceived Competence	Mastery Goal					
	Low			High		
	n	*M*	(*SD*)	*n*	*M*	(*SD*)
Adaptive Learning Strategy Use						
High	31	4.33	(.16)	43	5.28	(.16)
Low	53	4.03	(.15)	24	4.32	(.19)
Interest						
High	31	2.73	(.23)	43	3.84	(.22)
Low	53	2.19	(.20)	24	3.43	(.27)
Effort						
High	31	4.77	(.27)	43	5.22	(.21)
Low	53	4.46	(.20)	24	4.77	(.27)

Note. * Outcome for which a significant two-way interaction (between a mastery goal orientation and perceived competence) was found at alpha level of .013[11]. Means and standard deviation for two-way interactions (between a mastery goal and perceived competence) are presented in this table only for the outcome measure for which three-way interactions were not observed. Results for outcome measure of achievement are not presented because a significant three-way interaction (among a mastery goal, performance-approach goal, and perceived competence) was found (See Table 5.12).

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[11] Due to the Bonferroni adjustment, the critical value of $p < .013$ was used for the test of significance. This critical value was computed by dividing an α of .5 by 4 (number of dependent variables).

Table 5. 7   Means and Standard Deviation for Two-Way Interactions Between a
Performance-Avoidance Goal and Perceived Competence

| Perceived Competence | Performance-Avoidance Goal | | | | | |
| | Low | | | High | | |
	n	*M*	(*SD*)	*n*	*M*	(*SD*)
Achievement						
High	48	.38	(.15)	26	-.06	(.21)
Low	27	-.09	(.21)	50	-.11	(.19)
Adaptive Learning Strategy Use						
High	48	4.66	(.13)	26	4.96	(.18)
Low	27	4.14	(.18)	50	4.22	(.15)
Interest						
High	48	3.44	(.19)	26	3.13	(.25)
Low	27	3.05	(.24)	50	2.57	(.21)
Effort						
High	48	4.58	(.18)	26	4.99	(.25)
Low	27	4.48	(.24)	50	4.76	(.21)

Note. No significant two-way interaction was found for a performance-avoidance goal.
Means and standard deviations for two-way interactions (between a performance-
avoidance goal and perceived competence) are presented prior to those for three-way
interactions because no significant three-way interactions were found.

Hypothesis 2(b)

Perceived autonomy was predicted to function as a moderator of the relationship between a specific type of single-goal orientation and various learning- or achievement-related variables (achievement, adaptive learning strategies, task interest, and effort).

To test Hypothesis 2b, a series of ANOVAs was performed in which achievement goal orientation and perceived autonomy were entered as independent variables and with four types of learning outcome measures entered as dependent variables. The presence of two-way or three-way interactions between a specific type of achievement goal and perceived autonomy indicates that moderating effects of perceived autonomy exist that account for the relationship between achievement goal orientations and outcome measures.

A two-way interaction effect between a mastery goal and perceived autonomy on the outcome measure of effort was not found to be significant at the critical value of Bonferroni adjustment ($p < .013$), but it was significant at $p < .05$, (F (1, 141) = 4.08, $p = .02$, $\eta^2 = .03$, (Table 5.8). To understand further the specific nature of the interaction, a test was conducted for a simple effect of a mastery goal orientation at each level of perceived autonomy. The findings of the simple effect analysis suggested that the positive effect of a mastery goal orientation on effort was statistically significant only at the high level of autonomy. Accordingly, a positive effect of a mastery goal orientation on effort appeared stronger for students who scored high in perceived autonomy, F (1, 141) = 10.26, $p < .013$, $\eta^2 = .07$, than for students who scored low in perceived autonomy, F (1, 141) = .272, $p = .60$, $\eta^2 = .002$.
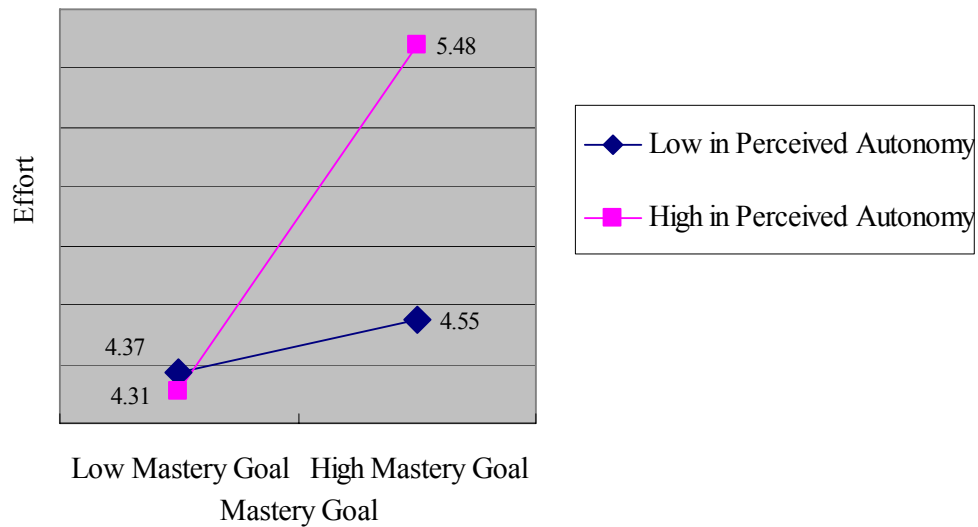
Figure 5. 2   The Interaction Effect Between a Mastery Goal and Perceived
Autonomy on Outcome Measure of Effort

A simple effect test for perceived autonomy at each level of a mastery goal

indicated that the effect of perceived autonomy varies as a function of a mastery goal.

Perceived autonomy showed a significant positive effect on effort for students who

adopt a mastery goal, but it showed a null effect on effort for students low in mastery

goal orientation. This finding of a simple main effect indicates that the main effect of

perceived autonomy on effort is not significant.

As indicated by the results of the simple effect analysis above, an interaction

between a mastery goal and perceived autonomy occurred, with the main effect of a

mastery goal on effort being significant, $F (1, 141) = 7.40$, $p < .013$, $\eta^2 = .05$. A main

effect of perceived autonomy on effort, however, was not found to be significant, $F (1,

141) = 2.80$, $p = .10$, $\eta^2 = .02$. As shown in Table 5.10, a high level of a mastery goal

led to a higher level of effort ($M = 5.01$, $SD = .19$) than a low level of a mastery goal orientation did ($M = 4.34$, $SD = .17$), regardless of perceived autonomy. This finding indicated that a mastery goal has its own independent ability to predict effort, but the presence of a significant interaction effect of a mastery goal and perceived autonomy indicated that the perceived autonomy plays a role as a moderator, strengthening the independent, positive impact of a mastery goal on effort. Thus, the adoption of a mastery goal with high autonomy led to the highest level of effort ($M = 5.48$, $SD = .24$). The amount of increased effort was greater than that obtained by simply adding the effect of perceived autonomy, demonstrating a synergic effect on achievement (Figure 5.2).

Except for the outcome measure of effort, no two-way interaction was found to be significant on any of the learning-related outcome measures (Table 5.8). For achievement, a performance-approach goal was the main predictor, $F(1, 141) = 6.71$, $p < .013$, $\eta^2 = .07$, but neither a mastery goal ($F(1, 141) = 1.48$, $p = .23$, $\eta^2 = .02$) nor a performance-avoidance goal ($F(1, 141) = .74$, $p = .39$, $\eta^2 = .008$) was a significant predictor. A high level of performance-approach orientation was related to higher achievement ($M = .32$, $SD = .16$) than a low level of performance-approach orientation did ($M = -.24$, $SD = .16$) (Table 5.9).

For the outcome measures of adaptive learning strategy use, interest, and effort, a main effect for a mastery goal was found to be significant, but no significant main effect was found for a performance-approach goal (Table 5.8). Students who scored high in a mastery goal orientation demonstrated higher scores in adaptive learning strategy use ($M = 4.89$, $SD = .15$), interest ($M = 3.70$, $SD = .20$), and effort

($M = 5.01$, $SD = .19$) than students who scored low in mastery goal orientation ($M =$

4.16, $SD = .13$ for adaptive learning strategy use; $M = 2.53$, $SD = .18$ for interest, $M =$

4.34, $SD = .17$ for effort) (Table 5.10). A performance-avoidance goal showed a

significant positive effect on effort, $F (1, 141) = 6.35$, $p < .013$, $\eta^2 = .04$, but it did not

reveal any main effect on other outcome measures (Table 5.8). Students high in a

performance-avoidance goal displayed greater effort ($M = 4.97$, $SD = .18$) than

students low in a performance-avoidance goal ($M = 4.39$, $SD = .17$) (Table 5.11).

Table 5. 8   ANOVA Results Summary for Perceived Autonomy as a Moderator

Variables	Achievement		Adaptive LS		Interest		Effort	
	F	η^2	F	η^2	F	η^2	F	η^2
M	1.48	.02	14.3**	.09	20.37**	.13	7.40**	.05
PA	6.71**	.07	2.11	.02	2.47	.02	.34	.00
PV	.74	.01	1.27	.01	.76	.01	6.35**	.04
AUT	.03	.00	1.16	.01	6.62**	.05	2.80	.02
M x AUT	2.09	.02	.74	.01	.56	.01	4.08*	.03
PA x AUT	.90	.01	.04	.00	.14	.0	.19	.00
PV x AUT	2.48	.03	.21	.00	1.59	.01	.63	.00
M x PA x AUT	2.05	.04	.23	.00	.76	.01	1.44	.02

Note. M = Main Effect for a Mastery goal, PA = Main Effect for a Performance-Approach Goal, PV = Main Effect for a Performance-Avoidance Goal, AUT = Main Effect for Perceived Autonomy, M x AUT = Two-Way Interaction Effect Between a Mastery Goal and Perceived Autonomy, PA x AUT = Two-Way Interaction Effect Between a Performance-Approach Goal and Perceived Autonomy, PV x AUT = Two-Way Interaction Effect Between a Performance-Avoidance Goal and Perceived Autonomy, M x PA x AUT = Three-Way Interaction Effect Among a Mastery Goal, a Performance-Approach Goal, and Perceived Autonomy

p < .05. **p* < .013[12].

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[12] Due to the Bonferroni adjustment, the critical value of .013 was used for the test of significance. This critical value was computed by dividing an α of .5 by 4 (number of dependent variables).

Table 5. 9   Means and Standard Deviation for Two-Way Interactions Between a Performance-Approach Goal and Perceived Autonomy

| Perceived Autonomy | Performance-Approach Goal | | | | | |
| | Low | | | High | | |
	n	*M*	(*SD*)	*n*	*M*	(*SD*)
Achievement						
High	43	-.12	(.20)	32	.24	(.26)
Low	33	-.36	(.26)	43	.40	(.17)
Adaptive Learning Strategy Use						
High	43	4.48	(.16)	32	4.79	(.24)
Low	33	4.30	(.22)	43	4.54	(.15)
Interest						
High	43	3.22	(.21)	32	3.71	(.32)
Low	33	2.62	(.30)	43	2.92	(.20)
Effort						
High	43	4.88	(.20)	32	4.91	(.31)
Low	33	4.33	(.29)	43	4.59	(.19)

Note. Means and standard deviations for two-way interactions (between a performance-approach goal and perceived autonomy) are presented prior to those for three-way interactions because no significant three-way interactions were found.

Table 5. 10   Means and Standard Deviation for Two-Way Interactions Between a
Mastery Goal and Perceived Autonomy

| Perceived Autonomy | Mastery Goals | | | | | |
| | Low | | | High | | |
	n	M	(SD)	n	M	(SD)
Achievement						
High	33	-.23	(.26)	42	.36	(.21)
Low	51	.05	(.17)	25	-.01	(.25)
Adaptive Learning Strategy Use						
High	33	4.18	(.23)	42	5.09	(.19)
Low	51	4.13	(.13)	25	4.70	(.23)
Interest						
High	33	2.78	(.30)	42	4.14	(.25)
Low	51	2.28	(.18)	25	3.25	(.31)
Effort						
High	33	4.31	(.29)	42	5.48	(.24)
Low	51	4.37	(.17)	25	4.55	(.30)

Note. * Outcome for which a significant two-way interaction (between a mastery goal orientation and perceived autonomy) was found at alpha level of .013 (Bonferroni correction). Means and standard deviations for two-way interactions (between a mastery goal and perceived autonomy) are presented prior to those for three-way interactions because the three-way interaction (among a mastery goal, a performance-approach goal, and perceived autonomy) on effort was not detected.

Table 5. 11   Means and Standard Deviations for Two-Way Interactions Between a
Performance- Avoidance Goal and Perceived Autonomy

| Perceived Autonomy | Performance-Avoidance Goal | | | | | |
| | Low | | | High | | |
	n	M	(SD)	n	M	(SD)
Achievement						
High	49	-.01	(.18)	26	.14	(.28)
Low	26	.28	(.24)	50	-.24	(.17)
Adaptive Learning Strategy Use						
High	49	4.49	(.16)	26	4.78	(.24)
Low	26	4.36	(.21)	50	4.48	(.14)
Interest						
High	49	3.01	(3.83)	26	2.87	(4.14)
Low	26	2.47	(3.58)	50	2.14	(2.89)
Effort						
High	49	4.51	(.20)	26	5.27	(.31)
Low	26	4.26	(.27)	50	4.66	(.18)

Note. Means and standard deviations for two-way interactions (between a
performance-avoidance goal and perceived autonomy) are presented prior to those for
three-way interactions because no significant three-way interactions were found.

Perceived Competence and Perceived Autonomy As Moderators of the Effect of Multiple Goal Pursuit

Hypothesis 3

It was hypothesized that perceived competence and autonomy moderate the effects of multiple-goal orientation on learning-related outcome measures (achievement, adaptive learning strategies, interest, and effort).

Hypothesis 3(a)

For students high in perceived competence, students adopting both a mastery goal and a performance-approach goal were predicted to show the most adaptive pattern of learning and achievement. On the other hand, for students low in perceived competence, students who predominantly pursue a mastery goal (without adopting a performance-approach goal) will show the most adaptive pattern of motivation.

To answer Hypotheses 3a and 3b, a series of ANOVAs was conducted to examine whether perceived competence plays a role as a moderator of the relationship between achievement goal orientations and learning-related outcome measures (achievement, adaptive learning strategy use, interest, and effort). The presence of three-way interaction effects between achievement goal orientations and perceived competence indicates that perceived competence moderates the effects of a multiple-goal pursuit. That is, the effect of goal groups with different combinations of a mastery goal and a performance-approach goal differ depending on the level of perceived competence.

Table 5. 12   Means and Standard Deviation for Three-Way Interactions Among a Mastery Goal, a Performance-Approach Goal, and Perceived Competence

	Performance-Approach Goal							
	Low				High			
	Mastery Goal				Mastery Goal			
	Low		High		Low		High	
Perceived Competence	n	M (SD)	n	M (SD)	n	M (SD)	n	M (SD)
				Achievement *				
High	16	-.15 (.27)	13	-.08 (.30)	15	.37 (.25)	30	.49 (.19)
Low	39	-.87 (.21)	8	.17 (.35)	14	.68 (.39)	16	-.37 (.22)
				Adaptive Learning Strategy Use				
High	16	4.17 (.23)	13	5.30 (.26)	15	4.49 (.23)	30	5.33 (.17)
Low	39	3.91 (.16)	8	4.18 (.32)	14	4.16 (.24)	16	4.47 (.22)
				Interest				
High	16	2.43 (.31)	13	3.63 (.36)	15	3.04 (.32)	30	4.05 (.23)
Low	39	2.16 (.22)	8	3.72 (.44)	14	2.21 (.34)	16	3.14 (.31)
				Effort				
High	16	4.14 (.31)	13	5.31 (.35)	15	4.57 (.32)	30	5.12 (.23)
Low	39	4.12 (.21)	8	5.04 (.43)	14	4.80 (.33)	16	4.51 (.31)

Note. * Outcome for which a significant three-way interaction (among a mastery goal, a performance-approach goal, and perceived competence) was found at alpha level of .013 (Bonferroni correction).

A three-way interaction effect among a mastery goal, a performance-approach goal, and perceived competence was found to be significant, F (2, 141) = 5.95, p < .013, on the outcome measure of achievement (Table 5.4). This finding indicated that the pattern of a two-way interaction between a mastery goal and a performance-approach goal differs depending on the level of perceived competence. A follow-up analysis was conducted to determine at which level of perceived competence this two-way interaction was significant. Results revealed that a

significant two-way interaction between a mastery goal and a performance-approach

goal appears at a low level of perceived competence, $F(1, 61) = 7.49$, $p < .013$, while

no significant interaction effect for a mastery goal and a performance-approach goal

was found at a high level of perceived competence. Specifically, at a high level of

perceived competence, a performance-approach goal showed a positive relationship

with achievement regardless of the level of a mastery goal orientation (Figure 5.3),

indicating the absence of an interaction between the two goals. On the other hand, at a

low level of perceived competence, a performance-approach goal showed a positive

relationship with achievement only when a mastery goal orientation level was low

(Figure 5.4).

When the students' perceived competence level was high, those who scored

high both in a mastery goal and a performance-approach goal (multiple-goal pursuit

of both a mastery goal and a performance-approach goal) demonstrated the highest

level of achievement ($M = .68$, $SD = .39$) (Table 5.12). On the other hand, when the

students' perceived competence level is low, those who scored low in a mastery goal

and high in performance-approach goal orientation (predominant pursuit of a

performance-approach goal in the absence of a mastery goal pursuit) displayed the

highest level of achievement ($M = .49$, $SD = .19$) (Table 5.12). Consistent with the

hypothesis, the students' perception of competence consequently played a role as a

moderator, determining which type of multiple-goal pursuit was the most beneficial in

enhancing achievement. The prediction of the most adaptive type of multiple-goal

pursuit was partially supported. For students with high perceived competence, as

predicted, the simultaneous pursuit of two goals (a mastery goal and a performance-

approach goal) was found to be the most favorable in relation to achievement, while for students with low perceived competence, on the contrary to the hypothesized prediction, the predominant pursuit of a performance-approach goal was found to be the most favorable.

In addition, students who pursued both a mastery goal and a performance-approach goal exhibited varying levels of achievement as a function of perceived competence. The simultaneous pursuit of a mastery goal and a performance-approach goal led to a high level of achievement ($M = .49, SD = .19$) when it was adopted by students high in perceived competence, while it led to a low level of achievement ($M = -.37, SD = .22$) when it was adopted by students low in perceived competence (Table 5.12). At a high level of competence, a mastery goal orientation was conducive to increased achievement regardless of a performance-approach goal, therefore causing the simultaneous pursuit of a mastery goal and a performance-approach goal to be conducive to increasing achievement. On the other hand, at a low level of competence, a mastery goal orientation showed a differential effect depending on a performance-approach goal, thus causing the simultaneous pursuit of a mastery goal and a performance-approach goal to weaken in the promotion of achievement.

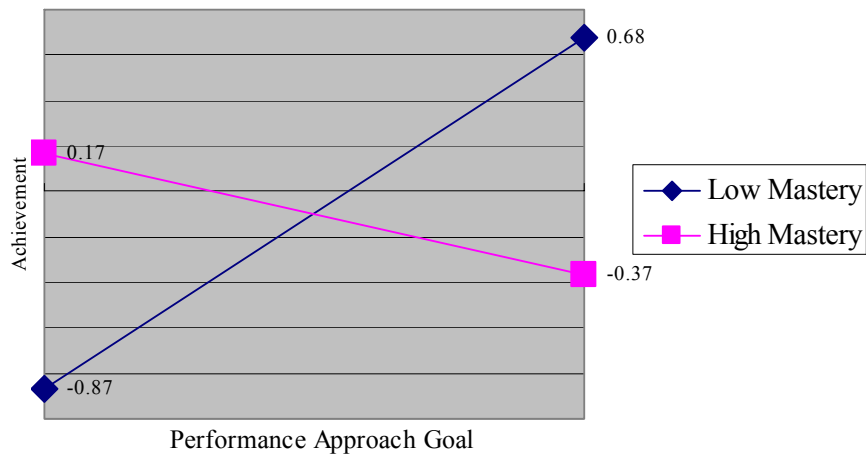**< For Students with Low Perceived Competence>**
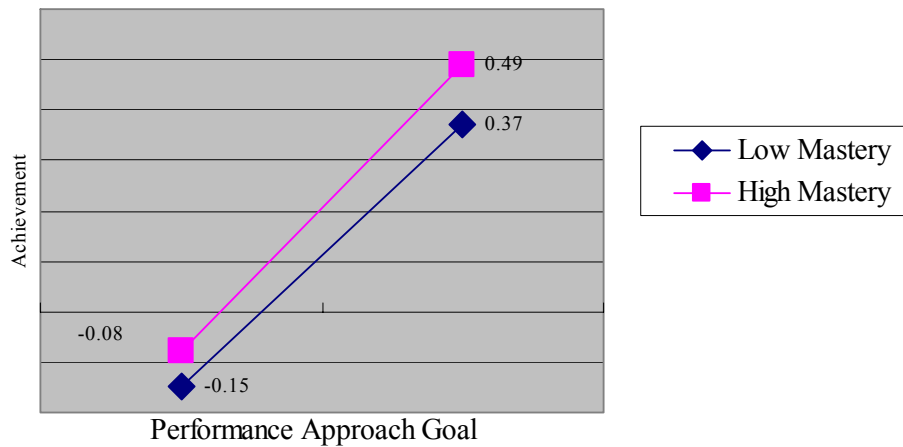
< For Students with High Perceived Competence>

Figure 5. 3 The Three-Way Interaction Effect Among a Mastery Goal, a Performance-Approach Goal, and perceived Competence on the Measure of Achievement. The first graph above displays the two-way interaction effect between a mastery goal and a performance-approach goal *at LOW Level of Perceived Competence.* The second graph above displays the two-way Interaction effect between a mastery goal and a performance-approach goal *at HIGH level of perceived competence*

Except for the outcome measure achievement, in contrast to the hypothesis, no three-way interaction effects were found to be significant on learning-related outcome measures (adaptive learning strategy use, interest, and effort). Across the levels of perceived competence, a mastery goal did not interact with a performance-approach goal for the prediction of adaptive learning strategy use, $F (2, 141) = .312$, $p = .73$, $\eta^2 = .004$, and interest, $F (2, 141) = 2.30$, $p < .013$, $\eta^2 = .007$. In other words, at both levels of perceived competence, a mastery goal showed an independent, positive effect on adaptive learning strategy use, $F (1, 141) = 14.30$, $p < .013$, $\eta^2 = .09$, and interest, $F (1, 141) = 26.21$, $p < .013$, $\eta^2 = .11$, regardless of a performance-approach goal. In addition, students who endorsed both a performance-approach goal and a mastery goal did not show a significant difference in the use of adaptive learning strategy use and interest depending on the level of perceived competence. For the prediction of effort, a significant three-way interaction was also not found. The dominant pursuit of a mastery goal (without adopting a performance-approach goal) showed the greatest effort regardless of perceived competence.

Hypothesis 3(b)

According to this Hypothesis 3b, for students high in perceived autonomy, those who pursue both a mastery goal and a performance-approach goal are predicted to show the most adaptive pattern of learning and achievement. On the other hand, for students low in perceived autonomy, those who predominantly pursue a mastery goal (without adopting a performance-approach goal) show the most adaptive pattern of motivation.

Table 5. 13   Means and Standard Deviation for Three-Way Interactions Among a Mastery Goal, a Performance-Approach Goal, and Perceived Autonomy

Perceived Autonomy	Performance-Approach Goal							
	Low				High			
	Mastery Goal				Mastery Goal			
	Low		High		Low		High	
	M	(SD)	M	(SD)	M	(SD)	M	(SD)
Achievement								
High	-.70	(.24)	.47	(.33)	.24	(.46)	.25	(.21)
Low	-.48	(.25)	-.25	(.43)	.57	(.25)	.24	(.23)
Adaptive Learning Strategy Use								
High	3.95	(.18)	5.01	(.28)	4.42	(.43)	5.17	(.20)
Low	3.96	(.18)	4.63	(.40)	4.30	(.19)	4.77	(.22)
Interest								
High	2.34	(.24)	4.10	(.37)	3.23	(.57)	4.18	(.26)
Low	2.02	(.24)	3.20	(.53)	2.54	(.26)	3.29	(.29)
Effort								
High	4.14	(.23)	5.61	(.36)	4.47	(.55)	5.35	(.25)
Low	4.00	(.23)	4.67	(.51)	4.74	(.25)	4.42	(.28)

No three-way interaction effect among a mastery goal, a performance-approach goal, and perceived autonomy was detected on any of the learning-related outcome measures, indicating that the interactive pattern of a mastery goal and a performance-approach goal, whether it is present or absent, appears consistent across the level of perceived autonomy. For the outcome measures of adaptive learning strategy use and interest, adopting both a mastery goal and a performance-approach goal, regardless of perceived autonomy, led to the highest scores in adaptive learning

strategy use and interest (see Table 5.13). For the outcome measures of achievement and effort, the predominant pursuit of a mastery goal (without endorsing a performance-approach goal) was the most adaptive while the predominant pursuit of a performance-approach goal (without adopting a mastery goal) was the most favorable for students low in perceived autonomy (see Table 5.13).

In summary, a performance-approach goal and a mastery goal showed a distinctive pattern of relationships with the learning-related outcome measures. Performance-approach goals were found to be a significant predictor of achievement, but it was not predictive of adaptive learning strategy use, interest, and effort. In contrast, mastery goals were a significant predictor of adaptive learning strategy use, interest, and effort, but not of achievement. Unlike either a mastery goal or a performance-approach goal, a performance-avoidance goal was not a significant predictor of any of outcome measures. Perceived competence significantly predicted two outcome measures, adaptive learning outcomes and interest, out of the four dependent variables, but perceived autonomy significantly predicted interest only.

Perceived competence and perceived autonomy played roles as moderators of the effects of a single mastery goal pursuit on some outcome measures. For example, students' perception of competence played a role as a moderator in the relationship between a mastery goal and adaptive learning strategy use, magnifying the positive effects of a mastery goal on adaptive learning strategy use. In addition, perception of autonomy moderated the relationship between a mastery goal and effort, strengthening the positive impact of mastery goals on effort. However, no moderating role of either perceived competence or perceived autonomy was found for the effect

106

of a single performance-approach goal pursuit or for the effect of a single performance-avoidance goal pursuit.

Lastly, perceived competence played a role as a moderator of the effects of multiple-goal pursuit on achievement measure. At a high level of competence, the adoption of a mastery goal has an additive effect on the positive impact of performance-approach goals, while at a low level of perceived competence, the adoption of mastery goals reduces the positive influence of performance-approach goals.

CHAPTER 6

DISCUSSION

The primary purpose of this study was to investigate the roles of two moderators—perceived competence and perceived autonomy—on the relationships of achievement goal orientations with learning-related variables. In the research literature, the question of which type of goal orientation is the most efficacious is still unanswered, mainly because of the ambiguous nature of the performance-approach goal orientation literature. Compared to the mastery goal and the performance-avoidance goal, the performance-approach goal orientation has generated the most disagreement about its nature and effects. This study, therefore, examined perceived competence and autonomy as moderators not only to understand better the effects of the performance-approach goal, but also to obtain evidence corroborating the positive relationship of a mastery goal and the negative relationship of a performance-avoidance goal with learning outcome measures.

This chapter comprises four sections. In the first section, the previously reported results are interpreted and discussed. Based on the findings of the present study, general discussions are presented in the second section. Following this discussion are remarks about the limitations of the study and suggestions for future studies. Finally, the chapter discusses the implications of the study findings on current learning theory and teaching practices.

Findings Pertaining to the Research Questions

In this section, main findings regarding the research questions are summarized and interpreted. More in-depth discussions are presented in the general discussion section.

The Effects of a Mastery Goal Orientation and Perceived Competence/Autonomy

This study examined the role of perceived competence and autonomy in the relationships of mastery goal orientations with learning outcomes. As described previously, this study has shown that a mastery goal has a positive association with adaptive learning patterns (use of adaptive learning strategy use, interest, and effort). This result is consistent with findings from earlier studies on achievement goal orientations (Elliot & McGregor, 2001; Greene & Miller, 1996; Kaplan & Midgley, 1997; Middleton & Midgley, 1997; Pintrich, 2000). Few studies, however, have examined which aspects of a mastery goal contribute to its positive influence on learning. One aim of the current study, therefore, was to explicate the psychological mechanism underlying the positive influence of a mastery goal and to explore how perceived competence and autonomy may contribute to the relationship between a mastery goal and learning-related outcome measures. Although the efficacy of a mastery goal and its stable relationship with learning outcome measures have been empirically supported, numerous researchers still raise questions about its predictive utility for academic performance (Harackiewicz, Barron, Pintrich, Elliot, and Thrash, 2002). In regard to the effect of a mastery goal on achievement, which is a point of conflict in the literature, the current study supported earlier studies reporting that a

mastery goal is not a significant predictor of achievement[13] (Barron & Harackiewicz, 2001; Harackiewicz, Barron, Pintrich, Elliot, and Thrash, 2002). Therefore, the current study addressed the moderating effects of perceived competence and perceived autonomy on the relationship between a mastery goal and achievement. By defining those effects, the study was able not only to test and clarify the relationship but also to suggest mechanisms that moderate the relationship.

Given the findings of the current study that a mastery goal was positively correlated with both perceived competence and perceived autonomy, the positive relationship of a mastery goal orientation with adaptive learning strategy use, interest, and effort may be elicited from high competence and autonomy components that underlie a mastery goal construct.

As the study demonstrated, the two psychological characteristics, perceived competence and perceived autonomy, played moderating roles in the relationship of a mastery goal and certain outcome measures (adaptive learning strategy use and effort). Specifically, perceived competence moderated the relationship between a mastery goal and adaptive learning strategy use, which is in accordance with the findings of Kaplan and Midgley's (1997) study. In the first case, the greater the students' perception of their competence, the greater was the magnitude of the positive influence of a mastery goal on adaptive learning strategies. Therefore, mastery goal oriented students with high perceived competence may report much more frequent use of adaptive learning strategy use than mastery oriented students with low perceived

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[13] The relationship between a mastery goal and achievement will be discussed in more detail in the general discussion section.

competence. The other significant interaction was between a mastery goal and perceived autonomy in terms of effort expenditure. This interaction indicated that the positive impact of a mastery goal on effort was more pronounced for students with a high level of autonomy in their task engagement than it was for students with a low level of autonomy. In other words, the greater the students' perception of autonomy, the greater was the magnitude of the positive impact of a mastery goal on the effort measure. Mastery oriented students with high autonomy, thus, are likely to expend greater amount of effort than mastery oriented students with low autonomy.

Perceived competence was found to be a significant moderator only for the relationship between a mastery goal and adaptive learning strategy use, not for the relationships between a mastery goal and interest or effort. For the outcome measure of interest, a mastery goal and perceived competence showed an additive effect on the variable in that both a mastery goal and perceived competence were main predictors; however, there was no interaction between a mastery goal and perceived competence for this variable. For the outcome measure effort, a mastery goal was the only significant predictor, and again there was no significant interaction between a mastery goal and perceived competence for this variable. This suggests that it is not "feeling competent" but "wanting to learn" that mainly contributes to increasing the amount of effort. This is presumably because that students feeling competent may be feeling that he or she does not need to expend much effort. Similarly, perceived autonomy was found to be a significant moderator for the relationship between a mastery goal and effort expenditure, not for the relationships between a mastery goal and adaptive learning strategy use and interest.

I conducted group mean comparisons[14] to examine whether a potential interaction pattern exists, even though it might not be significant, for a mastery goal and perceived competence/autonomy. An examination was then made of the effect of a mastery goal at each level of perceived competence and at each level of perceived autonomy. Very tentative support for the implication that perceived competence contributes to the efficacy of a mastery goal orientation was obtained. Across outcome measures, with the exception of achievement, the positive effects of a mastery goal were found to be more apparent at high levels of perceived competence or at high levels of perceived autonomy. This finding suggests that a high level of perceived competence or a high level of perceived autonomy might underlie the positive relationship of a mastery goal with most learning outcomes. High perceived competence or high perceived autonomy makes a significant difference in the learning pattern of mastery-oriented students. Given that mastery oriented students generally tend to be adaptive in learning processes, a mastery goal orientation is necessary for an optimal motivation and learning. However, "wanting to learn" (a mastery goal orientation) alone might not be sufficient for a successful learning unless a learner is equipped with well-satisfied psychological conditions. Accordingly, lacking perceived competence or perceived autonomy may not fully activate the adaptive function of a mastery goal orientation.

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[14] Although it is not recommended to conduct further analyses in the absence of significant interaction effects, group means were compared only for the exploratory purposes. Therefore, the results are only tentative so caution should be exercised for the interpretation about the findings of the group mean comparisons.

The Effects of a Performance-Approach Goal and Perceived

Competence/Autonomy

In the literature, questions about the relationship of performance-approach goals with learning patterns remain unanswered. To gain a better understanding of that effect, I investigated the role pf perceived competence/autonomy in the relationship between a performance-approach goal and learning outcomes.

Consistent with previous findings (Elliot, McGregor, & Gable, 1999; Harackiewicz, Barron, Tauer, Carter, & Elliot, 2000), a performance-approach goal was found to be a significant predictor of achievement. Despite its utility for predicting academic performance (achievement), a performance-approach goal was not predictive of other outcome measures, such as adaptive learning strategy use, interest, and effort. That finding partly agreed with those of earlier studies where a performance goal is reported to have null effects on some measures (Kaplan & Midgley, 1997; Pintrich & Garcia, 1991).

Unlike a mastery goal, that showed an interaction with perceived competence or perceived autonomy, a performance-approach goal displayed an interaction with perceived competence only for achievement[15]. For the other learning-related outcome measures, nither perceived competence nor perceived autonomy played roles as moderators, since they made no significant contribution to the relationship between a performance-approach goal and learning-related outcome measures.

Further exploratory analyses were performed to understand better the role of

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[15] A three-way interaction among a performance-approach goal, a mastery goal, and perceived competence was found to be significant and the discussion about this finding is made in the following 'General Discussion' section.

perceived competence in its relationship with a performance-approach goal, I examined the effect of a performance-approach goal for each level of perceived competence. In the absence of a significant interaction, a simple effect analysis is not appropriate. In this case, however, the analysis was conducted to determine whether a pattern of interaction existed, though it is not significant. Moreover, the simple effect test was used only to reveal whether any mean pattern of interactions existed among the low/high perceived competence and low/high performance-approach groups. For the outcome measures of adaptive learning strategy use, interest, and effort, which were not significantly related to a performance-approach goal, a performance-approach goal did not have any significant difference either across the levels of perceived competence or across the levels of perceived autonomy. Interestingly, however, for the outcome measure of achievement, which was significantly predicted by a performance-approach goal, the effect of a performance-approach goal was positive across the levels of perceived competence and across the levels of perceived autonomy. Moreover, the magnitude of the relationship of a performance-approach goal with achievement varied noticeably as a function of perceived competence or perceived autonomy. The positive association between a performance-approach goal and achievement appeared strongest at a high level of competence. This finding implies that perceived competence significantly strengthens the positive impact of a performance-approach goal on achievement. Considering the 2 (learning vs. performance) x 2 (approach vs. avoidance) framework of achievement goal orientation theory, it may be natural that performance oriented students tend to show higher achievement because their striving is focused on better performance and their

striving for better performance may be advanced further as a function of the approach component of a performance-approach goal. More importantly, students' strong perception of competence may facilitate the function of approach component of a performance-approach goal, thereby increasing the likelihood of obtaining higher achievement which performance-approach oriented students strive for.

Optimal Type of Multiple-Goal Pursuit and Perceived Competence/Autonomy

The various types of goal orientations are conceptually distinct, but studies have shown that students can adopt multiple goals simultaneously in real achievement-related settings. This possibility of a multiple-goal pursuit[16] raises another practical question: is the adoption of multiple goal orientations (specifically, high mastery and high performance-approach goals) more beneficial than the adoption of a single goal (for example, the pursuit of a mastery goal alone or the pursuit of a performance-approach goal alone). This question needs to be answered for another reason. According to the findings of the current study, a mastery goal and a performance-approach goal were related to distinct sets of learning outcome measures; that is, each type of goal was productive for only certain outcome measures. Given that all four dependent variables are important educational outcomes, one could easily suppose that the simultaneous pursuit of two goals, a mastery goal and a performance-approach goal, would lead to a more productive pattern of learning behavior and achievement. To investigate this possibility, the study tested

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[16] Multiple goal pursuit in the present study refers to the endorsement of both a mastery goal and a performance-approach goal.

relationships of multiple-goal orientations with learning outcomes and determined whether the optimal effects varied with the levels of perceived competence, perceived autonomy, or both.

In the literature, two perspectives are discussed regarding how to view a performance goal effect: a mastery perspective (traditional view) and a multiple-goal perspective (Harackiewicz, Barron, Pintrich, Elliot, Thrash, 2002). From the mastery perspective, a performance goal is viewed as undesirable because a performance goal is believed to result in a maladaptive pattern of learning and achievement. In contrast, from the multiple-goal-perspective, a performance goal orientation is viewed to be just as desirable as a mastery goal orientation. Thus, the mastery goal perspective claims that pursuing a single mastery goal promotes only the most optimal pattern of learning. The multiple-goal perspective, however, claims that the adoption of both mastery and performance goals leads to the most adaptive pattern of learning. While the literature shows inconsistent results on the effects of a performance goal, studies examining the effects of multiple goals have reported mixed results as to which combinations of multiple goals produce optimal motivation and learning.

For the outcome measure of achievement, it seemed that perceived competence played a critical role in determining which type of multiple-goal pursuit was the most productive. For students who were high in perceived competence, the adoption of both a mastery goal and a performance-approach goal resulted in the highest level of achievement. On the other hand, for students low in perceived competence, the pursuit of a performance-approach goal alone with no or less consideration of a mastery goal led to the highest scores on achievement. More about

116

this finding is to be discussed in the following section. Therefore, the effectiveness of the combination of a mastery goal and a performance-approach goal orientation was evident only when the students who adopted the goals were competent. This finding was supported by a three-way interaction effect among a mastery goal, a performance-approach goal, and perceived competence. Perceived autonomy, however, did not play a significant role in determining the optimal type of multiple-goal pursuit. On the other hand, depending on the level of perceived autonomy, different groups displayed the highest level of achievement. For students who rated high in perceived autonomy, the pursuit of a mastery goal alone led to the highest achievement scores, while for students who rated low in perceived autonomy, the pursuit of a performance-approach goal alone led to the highest achievement scores.

For the outcome measure of adaptive learning strategy use and interest, neither perceived competence nor perceived autonomy had a significant impact on determining which type of multiple-goal pursuit was optimal. The results showed that, regardless of perceived competence or perceived autonomy, students pursuing a mastery goal and a performance-approach goal simultaneously or students who pursued a mastery goal alone (without adopting a performance-approach goal) demonstrated high scores on outcome measures. There were no significant mean differences, however, between the pursuit of a mastery goal alone group and the multiple-goal pursuit group across the levels of perceived competence and perceived autonomy. The indications are, therefore, that the extent to which an individual is mastery oriented figures largely in the promotion of adaptive learning strategy use and level of interest and that the existence of a performance-approach goal orientation

117

does not weaken the positive impact of a mastery goal. The group with a multiple-goal pursuit, which included both a mastery goal and a performance-approach goal, was found to be at a greater advantage than the other groups, regardless of whether perceived competence or perceived autonomy was present, thus supporting multiple-goal perspective.

For the outcome measure of level of effort, perceived competence and perceived autonomy did not function as significant determinants of the most adaptive type of multiple-goal pursuit. The group of students, however, adopting both a mastery goal and a performance-approach goal did not show the highest scores on effort. The pursuit of a mastery goal alone was more advantageous for an increased effort than the simultaneous pursuit of two goals, regardless of perceived competence. The pursuit of a mastery goal alone, however, showed the highest score on effort only for students with high perceived autonomy. For students low in perceived autonomy, the pursuit of a performance-approach goal alone led to the greatest level of effort.

In sum, perceived competence and autonomy did not have critical roles in determining the optimal type of multiple-goal pursuit, because the group in pursuit of multiple goals and the group in pursuit of a mastery goal alone did not show a significant difference across the levels of perceived competence or autonomy. Perceived competence, however, determined when it was detrimental to adopt both a mastery goal and a performance-approach goal. For students with low levels of competence, the pursuit of two goals simultaneously significantly decreased their achievement. In addition, perceived autonomy determined when the pursuit of two goals or the pursuit of a mastery goal alone was unfavorable. For example, for the

outcome measures of achievement and effort, the effectiveness of a pursuit of two goals and the pursuit of a mastery goal alone became clear only when perceived autonomy was high. At low level of autonomy, the pursuit of a performance-approach goal alone emerged as more productive of the outcome measures of achievement and effort.

General Discussion

Four Patterns of Multiple-Goal Effects

A mastery goal and a performance-approach goal displayed a clearly contrasting pattern of relationships with the learning outcome measures. A mastery goal showed a positive relationship with the use of adaptive learning strategy use, interest, and effort, but it was not predictive of achievement. In contrast, a performance-approach goal displayed a positive relationship with achievement, but it was not a significant predictor of the use of adaptive learning strategy use, interest, and effort.

To discuss the complicated dynamics of multiple-goal effects, Harackiewicz et al. (2000, 2002) identified four patterns of achievement goal effects: additive, interactive, specialized, and selective goal patterns. The findings of the current study about the effects of an achievement goal pursuit will be discussed on the basis of the four goal patterns. As discussed in the literature review, an additive goal pattern means that a mastery goal and a performance-approach goal each have an independent positive or negative main effect on a single outcome measure, but the two goals do not interact with each other. Thus, in an additive goal pattern, the effect

119

of each type of goal orientation does not depend on any other, but instead has an independent positive or negative main effect of its own. This pattern of goal effects supports the multiple-goal perspective, where the adoption of both a mastery goal and a performance goal is viewed as beneficial. In the current study, however, there seemed to be no indication of an additive goal pattern, because two main effects of a mastery goal and a performance-approach goal were not present on any learning-related variable.

The second pattern of goal effects was an interactive goal pattern deriving from an interaction between a mastery goal and a performance-approach goal. In this case, an interactive pattern suggests that the effect of a performance-approach goal differs depending on the extent to which the student is mastery oriented. As a result, the adoption of a performance-approach goal paired with a mastery goal is viewed as conducive of adaptive patterns of learning, while the pursuit of a performance-approach goal alone without the simultaneous pursuit of a mastery goal is viewed as nonconductive of adaptive patterns of learning. Thus, there are two slightly different stances on interpreting the effects of a performance-approach goal: it can be additive (for example, the positive effect of a performance-approach goal exists independently of a mastery goal effect) or it can be interactive (for example, the positive effect of a performance-approach goal exists only when a mastery goal is accompanied). Both effect patterns, however, support the multiple-goal perspective. Consequently, in the case of either an additive pattern or an interactive pattern, the simultaneous pursuit of both a mastery goal and a performance-approach goal was viewed favorably. In the data for this study, direct evidence in support of an interactive goal pattern was not

found because no interaction effect was observed between a mastery goal and a

performance-approach goal[17]. The absence of interaction between a mastery goal and

a performance-approach goal is in accordance with previous studies. Most research

has failed to find empirical evidence to support this type of interaction (Baron &

Harackiewicz, 2001; Wolters, Yu, & Pintrich, 1996).

Although both an additive and an interactive goal pattern favor, to different

degrees and in different ways, the adoption of a performance-approach goal, they

share the same underlying assumption regarding the effect of a mastery goal, namely,

that a mastery goal is always adaptive to learning. The third pattern of goal effect, the

specialized goal pattern, takes a different stance regarding the effect of a mastery goal.

In this goal pattern, a mastery goal orientation is viewed as not always conducive to

adaptive learning; rather, a mastery goal may have a positive relationship with some

outcome measures and a negative relationship with other outcome measures. For

instance, a mastery goal may be predictive of the level of interest but not predictive of

achievement. Thus, a specialized goal pattern means that either type of goal

orientation, a mastery goal or a performance-approach goal, has its own specialized

types of outcome measures to account for. In other words, each goal type predicts

distinctively different sets of outcome measures.

The results of the current study provide clear evidence to support the

argument for specialized goal patterns in that it showed that a mastery goal and a

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[17] Direct interaction between a mastery goal and a performance-approach goal was
not observed, but the interactive pattern appeared to vary according to different levels
of perceived competence. The three-way interaction among a mastery goal, a
performance-approach goal, and perceived competence is discussed later.

performance-approach goal were each associated with a distinctive set of learning-related outcome measures. Among the four dependent variables (achievement, adaptive learning strategy use, interest, and effort), a mastery goal was, for example, a significant predictor of adaptive learning strategy use, interest, and effort, but it was not predictive of achievement. On the contrary, a performance-approach goal was a significant predictor of achievement, but it was not predictive of adaptive learning strategy use, interest, and effort. Therefore, for any given outcome measure, no two main effects, that is, the combination of one for a mastery goal or one for a performance-approach goal, were found. Instead, only one main effect was significant for each outcome measure. This finding means that neither a mastery goal nor a performance-approach goal is always productive for all types of learning outcome measures.

The last goal pattern, the multiple-goal effect pattern, which Harackiewicz et al. (2002) identified to discuss dynamic patterns of achievement-goal effects, is a selective goal pattern. In a selective goal pattern, contextual characteristics or individual differences determine whether achievement-goal effects are productive or not. For example, in a noncompetitive achievement situation, a mastery goal orientation may be productive, while in a competitive situation a performance-approach goal may more effectively promote desirable learning outcomes. Therefore, students may consciously or unconsciously select the achievement goal that they consider to be most effective and functional, depending on the contexts or the students' individual characteristics.

The results of the current study provide evidence that partly supports this goal

pattern. As discussed earlier, the data of the current study did not support an interactive goal pattern because no significant interaction effect was observed between a mastery goal and a performance-approach goal. A three-way interaction effect on achievement, however, was observed among a mastery goal, a performance-approach goal, and perceived competence on an outcome measure of achievement. The indication is that the interaction pattern of a mastery goal and a performance-approach goal may vary as a function of perceived competence. As briefly discussed above (in the 'Optimal Type of Multiple-Goal Pursuit' Section), Individuals who adopted both a mastery goal and a performance-approach goal and who perceived themselves as competent received a beneficial effect on achievement. On the other hand, individuals who adopted both goals and who perceived themselves as incompetent showed a lower level in achievement. Consequently, for students high in perceived competence, the pursuit of multiple goals comprising a mastery and a performance-approach goal led to the highest level of achievement. For students low in perceived competence, the pursuit of a performance-approach goal alone (without the simultaneous pursuit of a mastery goal) showed the highest scores on achievement. These findings implied that students' perception of competence (deriving from their individual differences and/or the students' perceptions of their ability in certain achievement contexts) seem to determine what type of multiple-goal pursuit is the most productive. This situation seems comparable to one calling for the selective goal pattern, where the goal effects are determined by individual differences and contextual variations.

In sum, the four patterns of multiple-goal effects impose different

perspectives on the effects of a mastery goal and the effect of a performance-approach goal. Additive and interactive patterns of goal effects postulate that a mastery goal orientation is always productive, while specialized and selective goal patterns posit that a mastery goal orientation is selectively productive on only certain educational outcomes. In addition, although they all view favorably the effect of a performance-approach goal, each goal pattern has a different viewpoint about whether the positive effect of a performance-approach goal exists independently of a mastery goal. As a result, each pattern represents a different description of when and how a performance-approach goal produces a positive effect. The current study found that a mastery goal did not predict achievement, but a performance-approach goal did. This finding substantiated the idea that a mastery goal orientation is not always effective for all learning outcomes and that a performance-approach goal can be effective, independently of the presence of the mastery goal, on particular outcome measures, in different contexts, and for some individuals. These findings are in line with the underlying assumptions of a specialized and a selective goal pattern.

Achievement Goals and Achievement

As discussed, a performance-approach goal was predictive of achievement, but a mastery goal was not. This difference in predictive utility for achievement may be due to difference in foci of the two goals on task engagement. Performance-oriented students are more likely to be self-focused, as indicated by by the names that have been used for performance goals: ability goals (Ames, 1992) or ego-involved goals (Nicholls, 1984). This is because the main concern of students with these goals

124

is to perform better than others and to present themselves as being more competent than others. In contrast, mastery-oriented students tend to be more task-focused, as reflected by calling them task goals (Nicholls, 1984) or learning goals (Dweck & Leggett, 1988), because students with these goals involve themselves in tasks to learn what the task has to offer them. They are less concerned about how they appear in the eyes of others. Therefore, the self-focused motive associated with a performance goal may be more directly related to achievement, because to present oneself as more competent than others, one usually has to demonstrate superior achievement. Clearly, the adoption of a performance-approach goal leads to higher achievement, and the self-focused quality of a performance-approach goal plays a central role in predicting achievement. On the other hand, the task-focused motive associated with a mastery goal could be either directly or indirectly related to achievement, because the successful accomplishment of a mastery goal indicates an improvement of one's ability that may or may not reveal itself in a higher level of academic performance, or achievement.

The data of the current study showed that students who adopt both a performance-approach goal and a mastery goal show varying levels of achievement, depending on the level of perceived competence. The study findings also indicated that students with low competence who adopted both a performance-approach goal and a mastery goal had lower outcome measures of achievement. In contrast, students with high competence who adopted both types goals had the highest levels of achievement. Individuals who adopted both types of goals may have had the two different types of foci, self-focus and task-focus. It seems that the two different foci

functioned in harmony in predicting achievement for competent students, while they functioned in conflict for students with low competence.

Students who pursued a performance-approach goal without also adopting a mastery goal may have been concerned only with performing better. This goal was much easier to achieve, because the students could simply claim that they achieved their goal as long as they saw that they did better than others; they did not challenge themselves to mastering the material. Similarly, mastery oriented students could say that they achieved their goal only when they made significant progress in their learning, even though they did not necessarily outperform others. In this regard, pursuing the two goals, with their different foci, might have been burdensome to students who felt incompetent. The reason is that doing better than others while also mastering the material may have been much harder for students lacking competence than pursuing only one type of goal. For competent students, however, the pursuit of two goals may have had results that were more positive because their strong perception of competence enabled them to manage the two challenges at the same time. On the other hand, students who were low in perceived competence might have struggled in the handling of two goals, with the negative result of lower performance scores.

The Role of Perceived Competence/Autonomy as Moderators

In the current study, each goal was found to interact with either the perceived competence or the perceived autonomy variable. Based on the various patterns of interactions and according to the different roles of a moderator, which were discussed

in the Method chapter, the interactive pattern of achievement-goal orientations and perceived competence/autonomy are discussed in the following paragraphs.

The results of the current study showed a significant two-way interaction effect between a mastery goal and perceived competence on adaptive learning strategy use. Additionally, a mastery goal and perceived competence both displayed a significant relationship with adaptive learning strategy use. Thus, the interaction between a mastery goal and perceived competence in predicting adaptive learning strategy use represents a two-way interaction with the two main effects being significant, where each of the two independent variables play a role as a booster of the magnitude of the main effect of each other. The presence of the two main effects indicated that both a mastery goal and perceived competence predicted outcome measures independently of each other, yet to different degrees depending on the level of the other independent variable. In addition, the combination of an interaction effect and two main effects indicated that there was a synergic effect when a mastery goal was adopted by students with high competence. In other words, the presence of perceived competence increased the magnitude of the positive relationship between a mastery goal and adaptive learning strategy use. Additionally, the presence of a mastery goal strengthened the magnitude of the positive relationship of perceived competence with adaptive learning strategy use. Accordingly, the adoption of a mastery goal in the presence of high competence resulted in a positive effect greater than the simple addition of the two main effects, leading to the highest scores for adaptive learning strategy use. Understanding the synergic effect of a mastery goal and perceived competence may make teachers' efforts more effective in helping

127

students use adaptive learning strategy use.

Another two-way interaction effect between a mastery goal and perceived autonomy was found for the outcome measure of effort. In addition, a mastery goal showed a significant relationship with effort, but perceived autonomy did not. This interaction pattern denotes an interaction in which the main effect of one independent variable (a mastery goal) was significant while the main effect of the other independent variable (perceived autonomy) was not significant. The magnitude of the positive relationship between a mastery goal (an independent variable with its main effect being significant) and effort was strengthened when the students adopting the mastery goal had high autonomy. In addition, the relationship between perceived autonomy (an independent variable with its main effect not being significant) and effort differed depending on the degree of mastery-goal orientation. Having high autonomy toward task engagement (for example, the students enjoyed the task performance or internalized the value of the task), along with a goal to master a material or develop one's skill (a mastery goal), led to greater effort. On the other hand, having high autonomy without wanting to learn (for example, the students were interested in the task but not necessarily involved in learning it) did not increase the expenditure of effort. This finding implies a general tendency for mastery-oriented students to expend more effort than other students. Moreover, the amount of effort that mastery-oriented students put into their learning increased to its maximum as the value or enjoyment of the task increased for the students. The practical implication is that a teacher's effort to improve students' autonomy by providing a rationale of doing a task (for example, to internalize the value of the task or by rendering a task more

interesting) may be fruitful only when the teacher also helps the students adopt a mastery goal.

Interestingly, the moderating effect of perceived competence and autonomy emerged in a way to strengthen the magnitudes of the existing relationships between achievement goals and learning-related outcome measures, rather than determine the direction of the relationships between achievement goals and outcome measures. For example, perceived competence strengthened the positive association between a mastery goal and adaptive learning strategy use. In addition, perceived autonomy magnified the positive association between a mastery goal and effort expenditure.

In reference to the various types of interactions outlined in the Method chapter, the interaction between a specific type of goal and perceived competence (or perceived autonomy) occurred only when the main effect for the corresponding goal was significant. For example, for the outcome measures of adaptive learning strategy use and effort, a mastery goal was a main predictor, but a performance-approach goal was not. Therefore, perceived competence (or perceived autonomy) exerted a moderating influence on the relationship between a mastery goal (that is, it strengthened the main effect of a mastery goal) and adaptive learning strategy use and effort, while perceived competence (or perceived autonomy) exerted no moderating influence on the relationship of either a performance-approach goal or a performance-avoidance goal with the same outcome measures. This pattern of interaction provides statistical evidence that the role of perceived competence (or perceived autonomy) is to superimpose a synergic on the existing positive relationship of a mastery goal, and not to act as a determinant of the direction of the effect of a mastery goal.

Consequently, the moderating role of perceived competence (or perceived autonomy) was not to clarify the effect of achievement goals that had unclear relationships with learning outcome measures; instead, the moderating role of perceived competence was to maximize the potential effect of achievement goals that already had a stable relationship with outcome measures.

Perceived competence was originally hypothesized to facilitate the positive role of the approach component of a mastery goal and a performance-approach goal, which in turn boosts the beneficial relationship that a mastery goal and a performance-approach goal has on outcome measures. In relation to a performance-avoidance goal, students' perception of competence (or autonomy) on outcome measures will buffer the negative relationships of performance-avoidance goals with learning behavior and achievement. Regarding a mastery-goal effect, this finding about the moderating role of perceived competence/autonomy was consistent with the hypothesis of this study. Regarding the effect of a performance-approach goal and a performance-avoidance goal, however, this finding contradicted the research hypothesis. The reason the findings did not support the hypothesis regarding a performance-approach goal and a performance-avoidance goal may be that the roles of perceived competence and perceived autonomy are to effectively boost the effects of achievement-goal orientations that already exist. In contrast to a mastery goal, however, neither a performance-approach goal nor a performance-avoidance goal has a significant relationship with any outcome measures. For this reason, perceived competence or perceived autonomy has no relationship to boost and therefore produces no significant synergic effect with either of the two performance goals. This

explanation, however, needs future study.

Further Speculations about the Role of Perceived Competence and Perceived Autonomy

The roles of perceived competence and perceived autonomy as moderators of the relationship between a mastery goal and learning-related variables can be discussed in the framework of expectancy-value theory. According to the expectancy-value theory, a person's motivation depends on the person's belief about how well he or she performs a task and the degree to which he or she places a value on the task (Wigfield & Eccles, 2000).

Findings of the study showed that perceived competence played roles as moderators on the relationships between a mastery goal and the use of adaptive learning strategy, and perceived autonomy moderated the relationship between a mastery goal and effort. Specifically, the positive impact of a mastery goal on learning strategy use and effort expenditure was strengthened when the adoption of a mastery goal was accompanied by students' perception of competence. Given that a person's value is embedded in one's pursuit of a goal, pursuit of a mastery goal reflects that he or she values the process of learning and developing competence rather than the outcome of learning and demonstrating competence. A student's learning or mastery-oriented value, embedded in the pursuit of a mastery goal, becomes more influential when paired by the student's belief about successful task performance. In addition, the learning or mastery-oriented value is in line with the idea of perceived autonomy, because it emanates from one's self-determined motivation rather than out of external

131

forces or feelings of guilty or responsibility. Therefore, it seems to be reasonable that

a mastery-oriented value shows stronger relationship with effort expenditure when the

students' perception of autonomy undergirds and reinforces the mastery-oriented

value.

Achievement Goal Orientations and Perceived Competence/Autonomy as Complements

In motivation literature, the effect of most competence-related concepts (for

example, competence, self-efficacy, and confidence) has been shown to be essential

for optimal patterns of learning, motivation, and achievement. Given the critical role

of the competence construct, a logical question is whether the possession of high

competence is sufficient for optimal learning, motivation, and achievement. To put it

differently, does high competence guarantee good learning, motivation, and

achievement? The findings of this study indicated that high competence was

necessary for successful learning, but the adoption of appropriate achievement goals

complemented the effect of perceived competence; that is, the achievement goal

affected the efficacy of perceived competence in promoting adaptive patterns of

learning, motivation, and achievement. Even students who already felt competent

demonstrated a significant increase in achievement when they adopted a performance-

approach goal. In other words, competent students had a tendency to show higher

levels of achievement, but the combination of high competence with a performance-

approach goal orientation resulted in even better performance. Similarly, competent

students showed significant improvement in adaptive learning strategy use, interest,

and effort expenditures when they adopted a mastery goal.

Likewise, the presence of perceived competence magnifies the relationships between achievement-goal orientations and learning-related outcome measures. For example, a performance-approach goal resulted in higher achievement when it was pursued by students with high competence than when the goal was pursued by students with low competence. In addition, a mastery goal led to greater use of adaptive learning strategy use and a greater amount of effort when the goal was pursued by students high in perceived competence than when it was pursued by students low in perceived competence. Accordingly, without a high level of competence, the adoption of a mastery goal or a performance-approach goal may not be as effective in promoting optimal learning behaviors.

A closer examination of the interplay between perceived competence and achievement-goal orientations in their effects on different types of learning-related variables may advance our understandings of the complex relationships between motivation, learning, and achievement. More than two motivational constructs may have a synergic effect on learning outcomes by increasing the effectiveness of each independent variable. Identifying motivational variables that have a mutual effect in maximize their separate positive functions is essential, because such variables can become conceptual tools for increasing teaching effectiveness and learning success.

For some outcome variables, a mastery goal served as a generator of motivation. Even though the students perceived themselves as being incompetent, the adoption of a mastery goal led to a significant enhancement of task interest. Assistance in helping such students to become mastery oriented may help them

become interested in the task. This procedure indicates that motivational constructs other than perceived competence may play a role to counteract the effects of low competence. Effort, for example, was not predicted by the level of perceived competence, but it was predicted by the degree of a mastery-goal orientation.

These examples indicate that perceived competence is an important starting point in improving most learning-related measures, but not always because competence can be complemented by other motivational constructs. Therefore, teachers should make informed decisions about how to cultivate student learning, motivation, and achievement, because different types of motivational support are required to promote different types of learning outcomes.

Statistical Methods

Regarding the relationships between achievement-goal orientations and learning-related outcome measures, two different statistical analyses were employed. Simple correlations were conducted in preliminary analyses to show the relationships among the key variables, and ANOVAs were performed to test research hypotheses. The correlation analyses, however, revealed different results from the ANOVAs regarding the relationships between achievement goal orientations and learning-related outcome measures.

According to the correlation analysis results, a performance-approach goal was positively related to all learning outcome measures except effort. The ANOVA test, however, showed that a performance-approach goal is a predictor of achievement only. Similarly, the correlation analysis yielded that a performance-avoidance goal

had null relationships with adaptive learning strategy use and effort and showed a significant negative relationship with achievement and interest. The ANOVA, however, revealed that a performance-avoidance goal was not predictive on any learning outcomes. According to the identified moderating role of perceived competence/autonomy in this study, the lack of a predictive utility for a performance-approach goal or a performance-avoidance goal may mean that perceived competence or perceived autonomy cannot interact with the goal orientation as effect moderators.

Furthermore, the simple correlations indicated that mastery goals are positively related to achievement, but the ANOVAs revealed that a mastery goal is not a predictor of achievement. Two different statistical analyses yielded different results, but a closer look helped identify the attributes of mastery goals that did or did not contribute to performance. The correlations show a relationship between two variables, mastery goal and performance-approach goal, but they do not consider other variables as moderators or mediators that could affect the relationship between mastery goals and achievement (for example, the performance-approach and competence). Thus, reliance on correlations or ANOVAs alone may not provide a full picture of the effects of achievement-goal orientations and rather it may simplify the relationship between mastery goals and academic performance. Possibly, there is a third variable that plays a moderating role in the relationship between a mastery goal and achievement. The intent of this argument is not to downgrade the findings from the simple correlation analysis; rather, it is to emphasize the importance of taking the particular type of statistical analysis used into account when interpreting empirical findings on the relationships between achievement-goal orientations and learning

135

outcomes. The better precision of such interpretations will ensure a richer understanding of the goal orientation literature. Harackiewicz et al. (2002) argued that different statistical methods employed to test the effect of a performance-approach goal showed differential results. For example, correlation analysis may yield a significant positive relationship with outcome measures while regression analyses may yield either null or mixed results. On a theoretical basis, breaking the variance of mastery goals into parts is informational, but on a practical basis, the mastery-goal orientation does not function in parts. In real achievement-related settings, mastery-goal orientation functions as a whole construct. Therefore, the use of multiple statistical analyses is advantageous because it allows us to grasp more aspects of a relationship between constructs and to identify more specifically those attributes of one construct that are related to the other.

Limitations of This Study

The limitations of the present study mainly involved problems regarding measurement, statistical analysis, and generalizability. Some limitations regarding measurement may be viewed in relation to the use of self-report measures and the operationalization of some key constructs. In this study, major variables of interest were assessed through participant's responses to self-report items but the use of self-report measures may involve problems with social desirability effect. To reduce this restriction, incorporating objective ratings such as observation as well as students' subjective rating may increase the reliability of the findings. Another limitation pertaining to the measurement issues is related to the conceptualization of the

construct of perceived autonomy. Perceived autonomy was defined by four types of motivational regulation, each differing in the degree of perceived autonomy. Findings from the validity analysis revealed that some items did not properly load on the intended factor, indicating that the conceptual distinctions among the external, introjected, and identified regulation subscales may need further elaboration. In particular, future research may be needed to investigate how introjected motivation fits into the controlled type of motivation or autonomous type of motivation. In the literature, introjected regulation is characterized as more of controlled type of motivation but the data of the present study did not quite support this claim because some items from the introjected regulation subscale cross-load on both subscales of identified regulation and introjected regulation. The concept of introjected regulation appears very complicated but clarifying the construct of introjected regulation is very critical because whether it falls under controlled types of motivation or under autonomous types of motivation defines the degree of perceived autonomy differently (Black & Deci, 2000). As such, concerns about the validity of the measure of perceived autonomy must be taken into account when interpreting the findings.

The limitation regarding statistical analysis of the present study has to do with statistical power. Although key variables of interest (especially as independent variables) were measured as continuous variables, ANOVA was employed as a statistical analysis where dichotomous variables are used as independent variables. Given that two-way or three-way interactions are main focus of this study, the use of ANOVA, instead of regression analysis, was due to the convenience of interpretation. Despite the advantage, however, considerable data and statistical power were lost by

dichotomizing continuous measures into high and low groups. Additionally, the median split was employed to group students, where the value of the median was the cutoff point where a continuous measure was split into two groups (for example, a group high in mastery goal orientation and a group low in mastery goal orientation). The problem with using a median-split method was that the cutoff point was not necessarily supported by theory but was only a convenient point for creating two groups (Kaplan & Midgley, 1997).

Furthermore, the findings of the study are limited in their generalizability for several reasons. First, there is an imbalance in the number of female and male participants. Most participants were female, and thus the findings cannot be generalized to a normal population of college students. While gender differences were not a big issue in the literature on achievement-goal orientation, some studies reported that female students favored mastery-goal orientation more than male students did (Pintrich, 2000). In this study, however, I did not observe significant gender differences for most measures, but it did find significant gender differences in the mastery-goal orientation and the identified regulation, with female students reporting higher scores on both scales. Consequently, future studies addressing the mastery goal and identified regulation should consider gender differences.

Another restriction to the generalizability of the findings has much to do with the characteristics of participants. The participants of the present study, as previously outlined, were enrolled in a required course, Introduction to Statistics. Because of the nature of a required course, the motivation for taking the course may be "because I have to" instead of "because I want to" Those students, therefore, were likely to show

138

a restricted range of perceived autonomy. Students taking the course as an elective, however, may have reported higher levels or a wider range of perceived autonomy, which in turn might have produce results that are more reliable. At any rate, future studies are needed that are based on data from samples that incorporate greater variation in the participants' perceptions of autonomy.

Furthermore, because all participants completed questionnaire items concerning attitudes associated with the statistics course that they were taking, their responses were domain specific. Caution is necessary, therefore, when generalizing the findings of the study to courses of other domains.

Suggestions for Future Studies

This study investigated perceived competence and perceived autonomy as moderators of the relationships between achievement-goal orientations and various learning outcome measures. The rationale of examining perceived competence and perceived autonomy as possible moderators was derived from self-determination theory, which posits that humans have three psychological needs, namely, competence, autonomy, and relatedness. Satisfaction of those needs gives humans a sense of well-being and fosters intrinsic forms of motivation. In the current study, only the first two needs were examined as moderators; consequently, the role of perceived relatedness needs to be investigated as a moderator in the future studies.

In addition to their moderating roles, perceived competence and perceived autonomy may also function as antecedents to the adoption of goal orientations. Students may not realize the psychological processes by which they adopt and pursue

particular types of goal orientations. Therefore, the two psychological factors, perceived competence and perceived autonomy, may have important roles in predicting students' adoption of goal orientations. For example, Elliot and Church (1997) reported that perceived competence negatively predicted the adoption of performance-avoidance achievement goals, and some studies have examined the role of perceived competence as an antecedent of goal adoption. Little research, however, has been investigated the role of perceived autonomy as an antecedent.

Correlation analysis results do not indicate a causal relationship between variables, but the findings from the correlation analysis in this study may suggest a hypothesis that students with high competence and high autonomy are more likely to pursue a mastery goal, while students with high competence and low autonomy are more likely to pursue a performance-approach goal. In addition, students with low competence and low autonomy can be hypothesized to endorse a performance-avoidance goal. As such, the two psychological characteristics, perceived competence and perceived autonomy, may contribute to the positive impact of achievement-goal orientations on learning outcomes. Taken together, these findings indicate that students may adopt achievement-goal orientations after they consciously or unconsciously consider the two psychological factors and their ability to maximize the impact of achievement-goal orientations on learning-related variables. To define the psychological mechanisms underlying the adoption of goal orientations, future studies should examine the potential roles of perceived competence and perceived autonomy as determinants of achievement goal adoption.

Moreover, studies in line with the roles of perceived competence and

autonomy as antecedents of goal adoption may open up additional research avenues. Perceived competence and autonomy, for example, may mediate the impact of the learning environment on achievement-goal adoption. A large body of empirical evidence indicates that learning contexts have a strong impact on student goal adoption. Thus, considerable research on the nature and characteristics of classrooms with mastery-goal or performance-goal structures has been conducted (Church, Elliot, & Gable, 2001; Midgley & Urdan, 2001; Wolters, 2004). Only a few studies, however, have addressed the learner's psychological processes that may mediate the impact of learning contexts or teacher behaviors on the students' choices of achievement goals. Previous studies (for example, Wolters, 2004) have reported that student perceptions of classroom goal structures (mastery and performance structures) affect the students' adoption and pursuit of goal orientations. Student perceptions of classroom goal structure, therefore, may also affect their perceptions of competence or autonomy, which indeed underlie the adoption of achievement goal orientations.

Besides, in order to examine whether the findings of the current study is robust and replicable, more empirical evidence that supports the generalizability of the findings about the roles of perceived competence/autonomy needs to be documented. In addition, the contradictory finding in the present study requires further investigations.

Lastly, the examination of the moderating effect of perceived competence/autonomy can also be extended into various types of achievement settings (for example, settings where a wider range of autonomy is allowed) and to various age groups (for example, K-12 school children).

Summary and Implications of the Present Study

This study has used Harackiewicz's four patterns of goal effects to describe how achievement goals affect learning-related outcome measures. A mastery goal and a performance-approach goal did not show either an additive or an interactive pattern of effects on any of the learning-related variables. Instead, a mastery goal and a performance-approach goal showed specialized patterns of effects in that each type of goal exhibited distinctive predictions over different sets of learning outcomes. Given that each type of goal orientation has its own positive relationship with different types of learning outcomes, it may be advantageous to students to adopt both a mastery goal and a performance-approach goal. The simultaneous pursuit of a mastery goal and a performance-approach goal, however, can be detrimental to the attempts of some individuals to improve their learning outcomes (for example, students with low – perceived competence attempting to improve achievement). The type of achievement goals that is optimal depends on individual characteristics and achievement contexts.

In the current study, student perceptions of competence and autonomy were investigated as moderators. As shown, the simultaneous pursuit of both a mastery goal and a performance-approach goal is conducive to achievement for students who feel competent. Such a dual pursuit of goals, however, is detrimental to students who are not sure of their competence. Thus, whether or not the multiple-goal pursuits are beneficial depends on the students' perception of competence. To ensure that a multiple-goal pursuit of a mastery goal and a performance-approach goal is productive, therefore, it seems critical to help students equip themselves with strong perceptions of their competence.

In addition, perceived competence and perceived autonomy play roles as moderators on the relationships of a mastery goal with certain outcome measures. Perceived competence increased the positive relationship between a mastery goal and adaptive learning strategy use, and perceived autonomy enhanced the positive relationship between a mastery goal and effort. This finding provides a practical tip on how to guide students to pursue optimal goal orientations. Teachers need to help students understand that they have the competence and the autonomy to learn, and, armed with that understanding, the students are more likely to adopt the optimal goal orientation.

Furthermore, teachers should keep in mind that there is no single goal orientation or multiple-goal orientation for all learning situations and motivational challenges. Goal orientations function differently for different individuals (e.g., competent or incompetent students; autonomous or controlled students) in different contexts (e.g., promoting or thwarting students' competence and autonomy). To prescribe or to help students discover adaptive learning patterns or ways to strengthen their motivation, teachers need to determine the best way to promote appropriate achievement goals that are unique and appropriate to the individual student and learning context.

To do so, teachers need to be able to know which combinations of motivational constructs (achievement-goal orientations and perceived competence/autonomy) maximize learning effectiveness in the given situation. In a real educational setting, no single control variable is handy, but rather all factors related to learning, motivation, and achievement come into play simultaneously.

Therefore, it seems critical to understand the complex mechanism through which achievement-goal orientations and students perceptions of competence and autonomy jointly affect learning outcomes. In doing so, a close examination of the interactions between perceived competence and goal orientations and their relationships with different types of learning-related variables may help us navigate the complex relationships among motivation, learning, and achievement. In particular, we must be aware of the motivational variables that seem to have a synergic effect on outcome variables. This understanding is necessary not only for theoretical reasons. It also gives educational practitioners meaningful information on how to help students acquire the motivation and the adaptive patterns to learn.

The Achievement Goal Orientation Inventory

The following 18 statements are related to your own attitudes and behaviors on college. You are to read each statement and rate yourself according to how well the statement describes you, not in terms of how you think you should be or what others do.

Strongly agree						Strongly disagree
1	2	3	4	5	6	7

1. I want to learn as much as possible from this statistics course.
2. It is important to me to do better than the other students in this statistics course.
3. I often think about, "What if I do badly in this statistics class?"
4. It is important for me to understand the content of this statistics course as thoroughly as possible.
5. My goal in this statistics course is to get a better grade than most of the other students.
6. I worry about the possibility of getting a bad grade in this statistics course.
7. I hope to have gained broader or deeper knowledge of the content when I am done with this statistics course.
8. I am working hard to demonstrate my ability relative to others in this statistics course.
9. My fear of performing poorly in this statistics course is often what motivates me.
10. I want to completely master the material presented in this statistics course.
11. I am motivated by the thought of outperforming my peers in this statistics course.
12. I am afraid that if I ask my instructor a "dumb" question, they might not think I'm very smart.
13. In a course like this, I prefer class materials that arouse my curiosity, even if they are difficult to learn.
14. It is important to me to do well compared to others in this statistics course.
15. I just want to avoid doing poorly in this statistics course.
16. In a course like this, I prefer class materials that really challenge me so I can learn new things.
17. I want to do well in this statistics course to show my ability to my family, friends, advisors, or others.
18. I wish this statistics course was not graded.

Mastery goal: 1, 4, 7, 10, 13, 16
Performance-Approach goal: 2, 5, 8, 11, 14, 17
Performance-Avoidance goal: 3, 6, 9, 12, 15, 18

Perceived Autonomy (The Academic Self-Regulation Questionnaire)

Using the scale below, indicate to what extent each of the following items presently corresponds to one of the reasons why you study and learn.

Does Not Correspond At All			Corresponds Moderately			Corresponds Exactly
1	2	3	4	5	6	7

A. Why do I do my assignment?

1. Because I want the instructor to think I'm a good student.

2. Because I'll get in trouble if I don't.

3. Because it's fun.

4. Because I will feel bad about myself if I don't do it.

5. Because I want to understand the subject.

6. Because that's what I'm supposed to do.

7. Because I enjoy doing my assignment.

8. Because it's important to me to do my assignment.

B. Why do I work on my class work?

9. So that the instructor won't be disappointed with me.

10. Because I want the instructor to think I'm a good student.

11. Because I want to learn new things.

12. Because I'll be ashamed of myself if it didn't get done.

13. Because it's fun.

14. Because that's the rule.

15. Because I enjoy doing my class work.

16. Because it's important to me to work on my class work.

C. Why do I try to participate in class?

17. Because I want the other students to think I'm smart.

18. Because I feel ashamed of myself when I don't try.

19. Because I enjoy participating in class.

20. Because that's what I'm supposed to do.

_21_. To find out if I'm right or wrong.

22. Because it's fun to participate in class.

23. Because it's important to me to try to participate in class.

_24._ Because I want the instructor to say nice things about me.

D. Why do I try to do well in this class?

25. Because that's what I'm supposed to do.

26. So my instructors will think I'm a good student.

27. Because I enjoy doing my classwork well.

28. Because I will get in trouble if I don't do well.

29. Because I'll feel really bad about myself if I don't do well.

30. Because it's important to me to try to do well in this class.

31. Because I will feel really proud of myself if I do well.

32. Because I might get a reward if I do well.

External Regulation: 2, 6, 9, 14, 20, 24, 25, 28, 32

[_Note_. items 9 and 24 were excluded]

Introjected Regulation: 1, 4, 10, 12, 17, 18, 26, 29, 31

Identified Regulation: 5, 8, 11, 16, 21, 23, 30

[_Note_. items 21 was excluded]

Intrinsic Regulation: 3, 7, 13, 15, 19, 22, 27

Appendix C

Perceived Competence (The Pattern of Adaptive Learning Survey)

Please read each statement carefully before answering. To the left of each item, please indicate the degree of your agreement or disagreement with each statement, using the scale below.

Strongly agree						Strongly disagree
1	2	3	4	5	6	7

1. If I have enough time, I can do most of the work in this class.
2. Some of the work is too difficult for me.
3. I am certain I can master the skills that are taught in this class this year.
4. No matter how hard I try, there is some work in this class I'll never understand.
5. I can do almost all the work in this class if I don't give up.
6. I am certain I can do even the most difficult work.
7. I am certain I can do a good job on the assignments and tests in this class this year.

Note. Item 2 and 4 were reverse coded.

Appendix D

<u>Adaptive Learning Strategies (The Pattern of Adaptive Learning Survey)</u>

Please read each statement carefully before answering. To the left of each item, please indicate the degree of your agreement or disagreement with each statement, using the scale below.

Not at all True		Somewhat True				Very True
1	2	3	4	5	6	7

1. When I do my class work / When working on a problem, I try to think about how it connects with something in everyday life.
2. After I write something the first time, I keep working on it to make it better.
3. If I can't solve a problem one way, I try to figure out a different way.
4. I spend some time thinking about how to do my work before I start it.
5. I ask myself questions when I work on my study, to make sure I understand.
6. I try to connect new work in my study to what I've learned before.

Appendix E

<u>Interest (The Intrinsic Motivation Instrument)</u>

Please read each statement carefully before answering. To the left of each item, please indicate the degree of your agreement or disagreement with each statement, using the scale below.

Not at all True		Somewhat True		Very True		
1	2	3	4	5	6	7

1. I enjoyed doing this class work very much.
2. This class work was fun to do.
3. I thought this class work was boring.
4. This class work did not hold my attention at all.
5. I would describe this class work as very interesting.
6. I thought this class work was quite enjoyable.
7. While I was doing this class work, I was thinking about how much I enjoyed it.

Note. Item 2 and 4 were reverse coded.

Appendix F

Effort (The Intrinsic Motivation Instrument)

Please read each statement carefully before answering. To the left of each item, please indicate the degree of your agreement or disagreement with each statement, using the scale below.

Not at all True		Somewhat True			Very True	
1	2	3	4	5	6	7

1. I put a lot of effort into class work.
2. I didn't try very hard to do well at this class work.
3. I tried very hard on this class work.
4. It was important to me to do well at this class work.
5. I didn't put much energy into this.

Note. R = reverse coded.
   Item 4 was excluded.

Appendix G

<u>The Demographic Information</u>

- ✧ UTEID:_____

- ✧ College:_____Major:_____

- ✧ Number of semesters:_____

- ✧ Gender: F (   )   M (   )

- ✧ Please provide three main reasons you are in college

  1._____

  2._____

  3._____

Appendix H

Factor Loadings for Achievement Goal Orientations

	Factor		
Items	PA	PV	M
It is important to me to do well compared to others in this statistics course.(PA)	.90	-.02	-.07
My goal in this statistics course is to get a better grade than most of the other students. (PA)	.89	-.03	-.09
I am motivated by the thought of outperforming my peers in this statistics course. (PA)	.87	-.03	-.06
I want to do better than the other students in this statistics course. (PA)	.76	-.11	.06
I am working hard to demonstrate my ability relative to others in this statistics course. (PA)	.66	.02	.17
I want to do well in this statistics course to show my ability to my family, friends, advisors, or others. (PA)	.50	.30	.22
I worry about the possibility of getting a bad grade in this statistics course. (PV)	-.14	.86	.06
My fear of performing poorly in this statistics course is often what motivates me. (PV)	.01	.80	-.02
I often think about, "What if I do badly in this statistics class?" (PV)	.01	.72	.07
I just want to avoid doing poorly in this statistics course. (PV)	.03	.56	-.03
I wish this statistics course was not graded. (PV)	-.18	.48	-.12
I am afraid that if I ask my instructor a "dumb" question, they might not think I'm very smart. (PV)	.13	.35	-.07
I want to understand the content of this statistics course as thoroughly as possible. (M)	-.12	-.02	.82
I want to learn as much as possible from this statistics course. (M)	-.14	-.09	.81
I hope to have gained broader or deeper knowledge of the content when I am done with this statistics course. (M)	.01	-.05	.81
I want to completely master the material presented in this statistics course. (M)	.15	.04	.64
In a course like this, I prefer class materials that really challenge me so I can learn new things. (M)	.07	-.12	.55
In a course like this, I prefer class materials that arouse my curiosity, even if they are difficult to learn. (M)	.07	.09	.51
Eigenvalue	4.53	3.12	1.92
% of Variance Explained	25.14%	17.33%	10.69%

Note. PA = Performance Approach, PV = Performance Avoidance, M = Mastery
Factor loading cutoff criteria of .35 was used.

Factor Correlation Matrix for Achievement Goal Orientations

Factor	1	2	3
1.Performance-Approach Goal	1.00		
2. Performance-Avoidance Goal	.07	1.00	
3. Mastery Goal	.28	-.20	1.00

Factor Loadings for Perceived Competence

	Factor
	1
I am certain I can master the skills that are taught in this statistics class this year.	.83
I am certain I can do a good job on the assignments and tests in this statistics class this year.	.81
I am certain I can do even the most difficult work.	.78
Some of the work is too difficult for me.	.74
I can do almost all the work in this statistics class if I don't give up.	.63
No matter how hard I try, there is some work in this statistics class I'll never understand.	.61
I thought this class work was quite enjoyable. If I have enough time, I can do most of the work in this class.	.31
Eigenvalue	3.36
% of Variance Explained	48.02 %

Appendix J

Factor Loadings for Four Subscales of Perceived Autonomy

	Factor			
	ITR	EXT	IDT/ITJ	ITJ
Because it's fun. (ITR)	.89	.06	-.04	-.06
Because I enjoy doing my assignment. (ITR)	.87	.17	-.01	.16
Because I enjoy doing my class work. (ITR)	.83	.09	.08	.05
Because it's fun. (ITR)	.82	.09	-.09	-.11
Because I enjoy participating in class. (ITR)	.69	-.08	.08	-.18
Because it's fun to participate in class. (ITR)	.64	-.10	.06	-.15
Because it's important to me to try to participate in class. *(IDT)*	.39	-.03	.23	-.06
Because that's the rule. (EXT)	.04	.77	.04	.10
Because that's what I'm supposed to do. (EXT)	.08	.72	.12	.07
Because that's what I'm supposed to do. (EXT)	-.09	.71	.01	-.00
Because I will get in trouble if I don't do well. (EXT)	-.07	.62	-.00	-.16
Because that's what I'm supposed to do. (EXT)	.15	.55	-.03	-.03
Because I'll get in trouble if I don't. (EXT)	.02	.48	-.05	-.32
Because I might get a reward if I do well. (EXT)	.16	.25	.03	-.18
Because it's important to me to try to do well in this class. (IDT)	-.01	-.09	.70	-.09
Because I'll be ashamed of myself if it didn't get done. (ITJ)	-.06	.26	.67	-.13
Because I will feel bad about myself if I don't do it. (ITJ)	-.09	.12	.65	-.12
Because it's important to me to do my assignment. (IDT)	.19	.00	.62	-.02
Because I will feel really proud of myself if I do well. (ITJ)	.02	-.01	.62	-.17
Because it's important to me to work on my class work. (IDT)	.20	.12	.59	.22
Because I'll feel really bad about myself if I don't do well. (ITJ)	-.27	.33	.55	-.08
Because I want to learn new things. (IDT)	.33	-.15	.44	-.07
Because I want to understand the subject. (IDT)	.30	-.08	.42	.24
Because I enjoy doing my class work well. (INT)	.33	.02	.38	-.21
Because I want the instructor to think I'm a good student.(ITJ)	.03	-.06	.16	-.80
Because I want the instructor to think I'm a good student. .(ITJ)	.01	.03	.182	-.76
So my instructors will think I'm a good student. (ITJ)	.06	.12	.078	-.73
Because I want the other students to think I'm smart. (ITJ)	.24	.12	-.130	-.61
Because I feel ashamed of myself when I don't try. (ITJ)	.07	.26	.151	-.30
Eigenvalue	8.72	3.34	1.77	1.42
% of Variance Explained	30.1%	11.52%	6.11%	4.89%

Note. ITR = Intrinsic Regulation, IDT = Identified Regulation, ITJ = Introjected Regulation,

EXT = External Regulation, Factor loading cutoff criteria of .40 was used.

Factor Correlation Matrix for Four Subscale of Perceived Autonomy

Factor	1	2	3	4
1. ITR	1.00			
2. EXT	.097	1.00		
3. IDT	.41	.27	1.00	
4. ITJ	-.21	-.40	-.27	1.000

Note. ITR = Intrinsic Regulation, IDT = Identified Regulation,

ITJ = Introjected Regulation, EXT = External Regulation

Correlation Matrix for Subscales of Perceived Autonomy Scale

	1	2	3	4
1. External Regulation	1			
2. Introjected Regulation	.59(**)	1		
3. Identified Regulation	.22(**)	.50(**)	1	
4. Intrinsic Regulation	.26(**)	.46(**)	.63(**)	1

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

Factor Loadings for Four Subscales of Perceived Autonomy

	Factor
External Regulation	.51
Introjected Regulation	.79
Identified Regulation	.69
Intrinsic Regulation	.68
Eigenvalue	4.69
% of Variance Explained	67.03 %

Factor Loadings for Adaptive Learning Strategy Use

	Factor
	ALS
I ask myself questions when I work on my study, to make sure I understand.	.67
I try to connect new work in my study to what I've learned before.	.55
I spend some time thinking about how to do my work before I start it.	.52
After I write something the first time, I keep working on it to make it better.	.49
When I do my class work / When working on a problem, I try to think about how it.	.45
If I can't solve a problem one way, I try to figure out a different way.	.43
Eigenvalue	1.64
% of Variance Explained	27.35 %

Note. ALS = Adaptive Learning Stategy Use

Factor Loadings for Interest

	Factor
	Interest
I thought this class work was quite enjoyable.	.94
This class work was fun to do.	.87
I would describe this class work as very interesting.	.87
I enjoyed doing this class work very much.	.87
While I was doing this class work, I was thinking about how much I enjoyed it.	.78
This class work did not hold my attention at all.	.69
I thought this class work was boring.	.67
Eigenvalue	4.69
% of Variance Explained	67.03 %

Factor Loadings for Effort

	Factor
	Effort
I tried very hard on this class work.	.87
I put a lot of effort into this.	.84
I didn't put much energy into this.	.82
I didn't try very hard to do well at this class work.	.77
Eigenvalue	2.72
% of Variance Explained	68.00 %

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