Assessing the Influence of a Self-Efficacy Intervention on Students’ Motivation and Performance

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This dissertation titled
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Abstract

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Assessing the Influence of a Self-Efficacy Intervention on Students’ Motivation and Performance

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Self-efficacy, defined as one’s belief in the capacity to perform some action, is generally assumed to be positively related to motivation and performance. However, the majority of research on self-efficacy has used passive observational designs, preventing researchers from making causal claims about the role of self-efficacy. In addition, there have been relatively few studies examining self-efficacy as an intervention. For the few exceptions, the interventions are often confounded with training or include other issues that limit internal, construct, and external validity. In the current study, a self-efficacy intervention independent of training was tested in a classroom setting. In addition to testing the intervention, individuals’ self-efficacy, goals, motivation and performance were tracked throughout the semester. It was predicted that individuals who have their self-efficacy inflated would plan to study less because they believe they have high capacity, but will perform worse on the exam. However, the self-efficacy intervention was not effective. Across the exams at the within-person level, self-efficacy was unrelated to planned study time and exam performance. However, at the between-person level, only an indirect effect of self-efficacy on exam performance was found.
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Introduction

Self-efficacy, defined as one’s belief in the capacity to perform some action (Bandura, 1997), is one of the most widely researched topics in management and psychology (Latham & Pinder, 2005). This extensive literature, quantitatively summarized in several meta-analyses, indicates that self-efficacy is positively related to performance (Sadri & Robertson, 1993; Stajkovic & Luthans, 1998), academic achievement (Multon, Brown, & Lent, 1991), self-regulated learning (Sitzman & Elly, 2011), health outcomes (Holden, 1991), and other variables (see Bandura & Locke, 2003, for a review of the meta-analyses). These results have led many researchers to recommend that organizations should take steps to raise individuals’ self-efficacy (Bandura & Locke, 2003; Colquitt, LePine, & Noe, 2000; Gist & Mitchell, 1992; McNatt & Judge, 2003; Salas & Cannon-Bowers, 2001; Wood & Locke, 1987). Although, it appears that the positive influence of self-efficacy is strong and quite pervasive, there are issues with the majority of research on self-efficacy that need addressing before organizations develop interventions to raise individuals’ self-efficacy (Vancouver et al., 2012). Primary among them is the issue that the majority of research on self-efficacy has used passive observational designs to investigate the influence of self-efficacy on motivation and performance. Passive observational designs, commonly referred to as correlational studies, do little to readdress alternative causal explanations like third variable influences and reversal causality. In addition, when studies have examined self-efficacy experimentally, particularly in field settings, the interventions often manipulate the quality of training (e.g., Gist, Schwoerer, & Rosen, 1989) as opposed to belief in
capacity directly. Thus, confounding variables are likely to permeate the manipulations. These issues should prevent researchers from making causal claims about self-efficacy, particularly in field settings. Furthermore, despite the calls for such interventions, no study in the management literature has investigated an intervention that directly raises individuals’ self-efficacy. The issue of an intervention to change individual’s self-efficacy is a controversial topic within self-efficacy research (Bandura, 2012). In particular, it might be important to follow-up an intervention with several waves of data collection to assess the long-term effects of the intervention because of possible boomerang effects of the intervention (Vancouver, Thompson, Tischner, & Putka, 2002). Moreover, a design where several waves of data collection occur represents a longitudinal design that provides another method for assessing casual processes.

Therefore, to overcome the limitations of previous research on self-efficacy in regards to motivation and performance, the methodological approach advocated by Vancouver and colleagues (Vancouver & Kendall, 2006; Vancouver, More, & Yoder, 2008; Vancouver et al., 2002; Vancouver, Thompson, & Williams, 2001) will be integrated with a self-efficacy intervention that either inflates or deflates individuals’ self-efficacy. The current study will investigate the influence of a self-efficacy intervention on motivation and performance in an educational setting.

Below, I briefly review social cognitive theory and control-theory based self-regulation theories with an emphasis on the role of self-efficacy in each theory and review the empirical studies used to test each theory. Finally, I describe a field-study that attempted to overcome some of the previous limitations on self-efficacy research.
Self-Regulation: The Role of Self-Efficacy

Self-regulation theories have become the dominant theoretical framework for understanding work motivation (Diefendorff & Chandler, 2010). Vancouver and Day (2005) define self-regulation as the “process involved in attaining and maintaining (i.e., keeping regular) goals, where goals are internally represented (i.e., within the self) desired states” (p.158; emphasis added). Self-regulation theories attempt to explain how individuals attain and maintain their goals over time and in different environments (Kanfer, 1990) and hold the promise of integrating middle-range motivational theories under one umbrella (Klein, 1989; Diefendorff & Chandler, 2010). However, there are differences among the self-regulation theories. These differences appear the starkest between social cognitive (Bandura, 1986; 2001; Locke & Latham, 2004) and control-theory based self-regulation theories (Carver & Scheier, 1998; Powers, 1973; Vancouver, 2008). Indeed, the relative usefulness of these theories for understanding human behavior has been debated in the literature numerous times (Bandura, 2012; Bandura & Locke, 2003; Locke, 1991; Powers, 1991; Vancouver, 2005; Vancouver, 2012). Most recently, the debate appears to be about the role of self-efficacy in self-regulation.

Social Cognitive Theory

Social cognitive theory takes an agentic perspective, which assumes that individuals engage in intentional influence over their motivation and that the course of actions in an individual’s life is determined by this intentional influence (Bandura, 1986; 2001; 2012). Within social cognitive theory, self-efficacy beliefs are the central mechanism of human agency; theorized to have an influence on everything from
motivation to life satisfaction (Bandura, 1997). According to Bandura, if individuals do not believe they have the capacity to achieve some level of behavior needed to reach the desired goal, they will not engage in that behavior or put forth minimal effort. Within an agentic perspective of humanity, this is not a desirable outcome because the individual’s low self-efficacy is a “self-debilitating” belief (Bandura, 2001). Rather social cognitive theory posits that individuals are better served if they are proactive in their motivation, which will occur if they believe they can engage in the behaviors needed to reach their goals. Thus, behavior is a function of looking optimistically forward, a process that leads to setting increasingly higher goals for themselves.

According to social cognitive theory, individuals attain valued goals by having high self-efficacy because it leads to higher motivation and better performance through two different paths (Bandura, 1997). The first path, referred to as the direct path, works because high self-efficacy motivates individuals to persist longer on a task with higher degrees of effort. The second path leads to increased motivation and performance through goals, which in turn positively affect persistence and effort. This later path is called the indirect path because self-efficacy’s positive effect is via goals. Specifically, according to social cognitive theory, individuals with higher self-efficacy are more likely to adopt goals, set more difficult goals, and persist on goals even after setbacks. These processes then lead to better performance (Bandura & Locke, 2003; Locke & Latham, 1990). This indirect effect is found in studies where goals are controlled statistically and the relationship between self-efficacy and performance drops markedly compared to when
goals are not included in the model. This pattern of results indicates that goals are a partial mediator (Baron & Kenny, 1986).

Although, the majority of research and theory regarding self-efficacy has focused on the positive effect, Bandura (1997) proposed that in a preparatory context that self-efficacy might be negatively related to performance. That is, in a preparatory context Bandura (1997) implied that self-doubt might be a good thing. For example, when discussing athletes, Bandura (1997, p.405) states, “In approaching learning tasks, athletes who perceive themselves to be highly efficacious in their capabilities have little incentive to invest much effort in tedious preparatory practice. Some uncertainty clearly benefits preparation.” Therefore, Bandura suggests that when individuals have high self-efficacy they may not allocate resources towards preparing for an upcoming task because they believe they have high ability.

Bandura has also been cautious about self-efficacy’s positive role in an educational preparatory context. For example, Bandura (1997, p.76) states, “Students who greatly underestimate the difficulty of academic course demands and remain blissfully free of self-doubt are more likely to party than to hit the books to master the academic subject matter.” Therefore, a classroom setting, where individuals need to prepare for an upcoming exam, low rather than high self-efficacy may be beneficial.

In sum, according to social cognitive theory, self-efficacy is the central mechanism responsible for individuals’ motivation, performance, and life satisfaction (Bandura, 1997). Although in general the theory focuses on the positive effect of self-efficacy, there is some ambiguity about the role of self-efficacy in a preparatory context.
Control theory based self-regulation (Carver & Scheier, 1998; Lord & Levy, 1994; Vancouver, 2008) also uses the concept of self-efficacy (often called expectancy in these theories), but it is not a central mechanism in these theories and its role is more complex regarding the relationship between self-efficacy and motivation. Control theory based self-regulation will be reviewed next.

**Control Theory Based Self-Regulation**

Control-theory based models of self-regulation (Carver & Scheier, 1998; Lord & Levy, 1994; Vancouver, 2008) have become prominent theoretical accounts of motivation. These models are based on more comprehensive cybernetic or control theory models of human behavior (Grush, 2004; Jagacinski & Flach, 2003; Powers, 1973). In control-theory based models, individuals compare their current states to their goals and perform some action depending on the discrepancies (Vancouver, 2008). In addition, many of these theories assume the magnitude of the discrepancy affects the amount of resources allocated. An important element of control theory models of self-regulation is that they are dynamic, using negative feedback loops to represent interactions between the person and environment over time. That is, behavior creates changes within the agent and to the environment in which the system is interacting. Likewise, changes in the environment and the agent can cause changes in behavior (Vancouver, 2005).

Figure 1 depicts the negative feedback loop as used in control theory approaches. Above the environment/person border is what Vancouver (2008) calls the self-regulatory agent, which is an information processing subsystem. These subsystems are hypothesized to be hierarchically arranged within persons (Austin & Vancouver, 1996; Carver &
Scheier, 1998), and their interactions with other information processing subsystems and the environment gives rise to emergent behavior at the system level (i.e., human behavior). The core components of the self-regulatory agent are the input, comparator, and output functions. The input function determines the content of the goal for the self-regulatory agent. The goal level in a self-regulatory agent is the desired perception of the regulated variable. The comparator compares the perception to the desired perception and, if there is a discrepancy between the two, an error is sent to the output function. The output function then determines some action that is elicited to reduce this discrepancy.

![Figure 1. Negative feedback loop](image)

In stark contrast to social cognitive theory (Bandura 2012; Bandura & Locke, 2003), the original perceptual control theory model (Powers, 1973) does not include a self-efficacy mechanism. However, a related concept, expectancy, has been a part of
more recent control theories (Carver & Scheier, 1981; Lord & Levy, 1994). Yet, it has primarily been the work of Vancouver et al. (2001; 2002; 2005; 2008; 2010) has been most explicit about integrating self-efficacy/expectancies into models of self-regulation. Some of this work has been in the form of computational models of self-regulation that incorporate dynamic or changing expectancies (Vancouver et al., 2010).

In regards to self-efficacy, Vancouver (2005, p. 47) states, “Self-efficacy more comprehensively reflects the accumulation of expectancies related to the numerous subsystems thought to be relevant to achieving specified levels of performance.” He further indicates that individuals can use self-efficacy to provide information about where resources should be allocated and how much resources should be allocated. This information can have different effects on motivation and performance depending on the context. In particular, Vancouver (2008) separates goal choice from goal planning when discussing the influence of self-efficacy. Similarly, to Bandura (1997), Vancouver (2008) proposed that self-efficacy positively relates to goal choice. Therefore, if an individual does not believe they can achieve a goal for some task, they will be less likely to engage the task. For example, when a student is choosing which classes to take for the semester, they may choose to take a psychology course over a calculus course because they have higher self-efficacy for getting an A in the psychology course compared to the calculus course. However, Vancouver (2008) proposes that self-efficacy negatively relates to motivation while planning for a goal they have already adopted. In that case, the higher individuals’ self-efficacy, the fewer resources they will allocate towards the goal because they believe it can be achieved more easily (e.g., requires fewer resources). For example,
once a student starts taking a course, self-efficacy will negatively relate to motivation, because when individuals have high self-efficacy that they will get an A, they believe fewer resources (i.e., study time) are needed to get an A compared to when self-efficacy is lower.

These two processes (i.e., goal choice and resource allocation) create a complex relationship between self-efficacy and motivation. Vancouver (2008) has proposed that the relationship between self-efficacy and motivation is non-monotonic and discontinuous. Figure 2 depicts this relationship. Kukla (1972) first discussed the non-monotonic, discontinuous relationship and Carver and Scheier (1998) integrated into their self-regulation theory. Generally, this relationship reflects the notion that when one believes they have no chance of achieving the goal (extremely low self-efficacy), they are not motivated to strive for that goal (i.e., allocate no resources). However, if the individual believes the task is somewhat achievable, but still difficult, they will allocate many resources to achieve the goal. However, as perceived ability (i.e., self-efficacy increases), they will allocate fewer resources.

To test the non-monotonic, discontinuous model one needs to have at least three levels of self-efficacy. For example, individuals may, after signing up for the class, come to believe they have low capacity to understand chemistry and therefore stop attending or drop the class. They may also believe that a calculus class will be difficult because the lack strong math skills, but believe that if they work hard they can achieve the goal. Therefore, they must allocate many resources towards achieving their math goal. However, in a psychology course, they may believe they have high capacity and therefore
allocate fewer hours to studying because they believe they can easily achieve their goal. Because individuals are often regulating multiple goals (Vancouver et al., 2010), the non-monotonic, discontinuous model provides a potentially reasonable compromise for allocating sources across one’s strengths and weaknesses. In the student example, chemistry gets zero resources, math receives many resources, and psychology gets few resources.

**Figure 2.** Proposed relationship between self-efficacy and motivation

In sum, according to control-theory based self-regulation theories, individuals’ motivation is based on reducing the discrepancy between their current state and their desired state. In addition, individuals work on the goal with the largest discrepancy. In regards to self-efficacy, individuals use self-efficacy beliefs as information about where
to allocate resources and how much resources should be allocated given perceived need (i.e., discrepancy and capacity to reduce discrepancy). The theory’s prediction regarding self-efficacy and motivation is consistent with social cognitive theory in regards to goal choice. Individuals will choose and therefore allocate resources towards goals they believe they can achieve. However, the theories appear to differ in regards to goal striving. Specifically, control-theory predicts that individuals will allocate fewer resources once the goal is adopted. Whereas, social cognitive theory predicts that individuals will allocate more resources. Now that the role of self-efficacy in each theory has been described, the empirical data will be examined. I will first focus on empirical studies based from social cognitive theory and then discuss empirical studies based from control-theory.

**State of the Empirical Literature on Self-efficacy**

Self-efficacy is one of the most widely studied topics in psychology. Currently, there are over 21,000 references for self-efficacy on PsychINFO. In addition, to the large amount of primary studies regarding self-efficacy, there have been a number of meta-analyses. Below I summarize the particularly relevant meta-analyses, and then I discuss issues with the primary studies used in these meta-analyses.

**Results from the meta-analyses.** Stajkovic and Luthans (1998) conducted a meta-analysis of 114 studies in both the lab and the field and found that the correlation corrected for unreliability (r+) between work-related performance and self-efficacy was .38. Multon et al. (1991) conducted a meta-analysis on 38 studies regarding self-efficacy and academic performance and found the same relationship between academic
performance and self-efficacy ($r^+ = .38$). Colquitt et al. (2000) conducted a meta-analysis on the psychological variables relating to training. In regards to self-efficacy, they found that pre-training self-efficacy was positively related to motivation to learn ($r^+ = .42$), post-training self-efficacy ($r^+ = .59$), transfer ($r^+ = .47$), declarative knowledge, ($r^+ = .30$), skill acquisition ($r^+ = .32$), and job performance ($r^+ = .22$). Richardson, Abraham, and Bond (2012) conducted a meta-analysis on college academic performance more broadly, including 71 studies that investigated the relationship between self-efficacy and academic GPA during college. They found that the relationship between academic self-efficacy (i.e., general perceptions of academic capability) and GPA was .31 and that for performance self-efficacy (i.e., perceptions of capability to reach a desired level of GPA) and GPA it was .59. Finally, Sitzman and Ely (2011) found that relationship between self-efficacy and self-regulated learning was .29. These meta-analyses indicate that self-efficacy had a moderate, positive relationship with performance and learning. Therefore, it is not surprising that many researchers have called for interventions to raise self-efficacy (e.g., Gist & Mitchell, 1992). However, there are several methodological concerns with the primary studies used in these meta-analyses, which I discussed next.

**Primary study issues: correlation is not causation.** Studies of self-efficacy’s causal role on motivation and performance come in two flavors: passive observational (i.e., correlational) and experimental designs. Each presents unique challenges for valid conclusions of cause (i.e., internal validity). The main methodological problem with research examining the influence of self-efficacy on motivation and performance is that a majority of the research has used passive observational designs. These studies comprise
the majority of the studies used in the above meta-analyses. The use of passive observational designs is problematic because researchers do not know the temporal order of effects. Moreover, the possibility of third variables makes it difficult to rule out alternative explanations. For example, a possible alternative explanation for the positive influence of self-efficacy on performance is that self-efficacy is a proxy measure of an individual’s ability. Those individuals who have high ability are likely to believe they have high ability (i.e., high self-efficacy) and it is the high ability, as opposed to the belief in high ability, which leads to high performance. Baumeister, Campbell, Krueger, and Vohs (2003) note a similar problem in their review on self-esteem. Specifically when discussing task-specific self-esteem, which is essentially self-efficacy, they conclude that it is not surprising that there is a correlation between people’s success at some task and their self-evaluation for the task because these evaluations are a function of their ability.

Because the majority of research testing the direct path of self-efficacy on motivation and performance uses passive observational designs, the only way to rule out the third variable explanations is to control for the variables that may be responsible for explaining the relationship between self-efficacy and performance. However, this is often difficult because it is not possible to determine a priori all the variables that vary between people that may be lead to a relationship between self-efficacy and performance or to measure the variables with a high degree of accuracy.

Bandura (Bandura & Locke, 2003; 2012) claims that a number of studies have controlled for many such variables and researchers still find that self-efficacy positively related to performance. For example, Zimmerman, Bandura, and Martinez-Pons (1992)
find that children’s academic self-efficacy positively related to academic goals and final grades independent of their prior grades and the academic goals their parents set for them. However, there are several other variables were not controlled, such as general mental ability, personality, or socioeconomic status.

Controlling for all the possible variables involved is difficult and most data sets do not contain all these variables. An exception is a data set developed by Judge, Jackson, Shaw, Scott, and Rich (2007). These researchers were interested in determining whether self-efficacy had a positive relationship with job performance after controlling for general mental ability, the Big 5 personality traits, job experience, and task experience. To create the data set, they first meta-analyzed the relationships among the variables in the study. These various meta-analytic effect sizes were then combined to create a meta-analytic path model that included a path between self-efficacy and job performance as well as paths between many other variables and performance. Judge et al. found that self-efficacy became negatively related to job performance when general mental ability, personality, and prior job and task performance where included in the model, though the effect was not significant.

The Judge et al. (2007) study is the most comprehensive study in regards to controlling for third variables and provides support for the position that the relationship between self-efficacy and performance is a function of differences in ability and other distal variables. However, there are still concerns with this study. First, there are some concerns about using meta-analytic path analysis because not all the same variables come from the same primary studies. For example, some studies examined general mental
ability and personality, but not self-efficacy, and some studies examined self-efficacy and job performance, but not personality. Therefore, when combining large number of studies with different populations, it becomes more likely to reject the homogeneity of the correlation matrices. However, Judge et al. believe the issue of combing effect sizes from different studies may not be much of an issue. Judge et al. (p. 117) state, “So, the only way that analyzing results cumulated from different studies would affect the results is if, somehow, the study characteristics were unrepresentative of the population of studies and interactive with the effect sizes. This seems an unlikely prospect and one that has not been shown with any known multivariate analyses of meta-analytic data.”

More problematic for the Judge et al. (2007) approach is that some of the presumed causes of self-efficacy and performance that were controlled might have actually been caused by self-efficacy. Indeed, many studies have partialled out past performance from subsequent performance and found that the self-efficacy relationship with subsequent performance is no longer positive or significant (e.g., Yeo & Neal, 2006). However, Bandura (1997) has argued that the procedure of partialling out past performance from performance also removes the possibility of finding self-efficacy’s effect because self-efficacy caused past performance. To support that position, Bandura and Wood (1989) demonstrated that removing self-efficacy’s covariance from past performance prior to using past performance as a control does not result in self-efficacy losing its positive effect on subsequent performance. Of course, that would also be the pattern if a third variable was causing performance and self-efficacy. The bottom line,
however, is that partialling or controlling variables is not conclusive regarding self-efficacy’s role.

In sum, the first issue with the primary studies is that they are mostly passive observational and causal conclusions are difficult to defend given that design. Indeed, the most comprehensive review of the literature on self-efficacy indicates that it is not significantly related to job performance once a number of possible third variables are controlled. However, not all the research regarding self-efficacy has been passive observational and a number of experimental studies have examined the influence of self-efficacy. I discussed these next.

**Experimental studies.** Boyer et al. (2000) found that there have been 139 experimental studies where self-efficacy was manipulated. Although it is difficult to determine the exact percentage of experimental studies in the previous mentioned meta-analyses, the authors acknowledge that majority of the studies were passive observational (e.g., Stajkovic & Luthans, 1998). Although experiments are better at determining the causal nature of self-efficacy, these studies also contain a number of methodological issues. Below, I summarize the findings form a meta-analysis focused on the experimental studies, but then address issues with the primary studies used in that meta-analysis.

Experimental research reduces many of the threats to internal validity found in passive observational designs. In regards to self-efficacy, there have been a number of experimental studies. Boyer et al. (2000) performed a meta-analysis on the experimental studies examining the relationship between self-efficacy and performance and found the
effect size was $d = 0.69$. Bandura (Bandura & Locke, 2003; 2012) have used this statistic to show that self-efficacy’s positive relationship with performance is because self-efficacy causes performance. However, this claim needs to be made cautiously. Boyer et al. also found that the majority of experimental studies examining self-efficacy’s influence on job performance used training vs. no training as the manipulation of self-efficacy. Training is likely to increase individuals’ capacity as well as individuals’ belief in capacity, leaving the same problem as the passive observational studies (i.e., a confounded third variable).

An example experimental study is Locke, Frederick, Lee, and Bobko’s (1984) investigation of the effect of differences in training, goals, and self-efficacy on performance. Individuals first participated in a practice trial where they had to brainstorm as many uses for a common household item as they could. After the practice trial, they filled out a self-efficacy measure and then were randomly assigned to one of three training conditions that also manipulated self-efficacy. The self-efficacy measure had individuals indicate whether or not they could list a certain number of uses, ranging from 2-16, in one minute and how certain they were they could list each number of uses in one minute. After they filled out the self-efficacy measure, they were randomly assigned to one of three training conditions. One training condition received three different strategies for brainstorming (high-strategy condition). In another training condition, individuals were told to only use very good ideas and not use any ideas that are “crazy and far out”. This advice is counter to most research on brainstorming and, indeed, was labeled the “anti-brainstorming” condition. Finally, the control condition received no strategies.
After they were assigned to training, individuals then participated in three one-minute trials. Self-efficacy was measured before each trial.

Those in the high-strategy condition had the highest levels of self-efficacy. Self-efficacy was found to positively relate to goal choice. Specifically, individuals with higher self-efficacy had higher self-set goals for the number of uses they could come up with in one-minute. In addition, individuals with higher self-efficacy had better performance, whether controlling for goals or not. In addition, the effect of self-efficacy was still significant on performance after ability and past performance were controlled. However, the effect on performance after past performance was controlled was much smaller, going from .39 to .13. The results of this study indicate that, if individuals are better trained, they will have higher self-efficacy and that those who are better trained will set higher goals and will perform better. However, there was no preparatory element to this study. Individuals did not need to plan how much resources they were going to allocate towards achieving their goal. They simply received better or worse training and then engaged in the task. This is common among the research on self-efficacy and training, which makes it difficult to determine whether training caused performance or self-efficacy caused performance.

The other common way that self-efficacy was manipulated was through modeling. Bandura (1997) theorizes that learning occurs through modeling, which is when an individual observes another individual engaging in some behavior and then can visualize performing the behavior. When an individual observes a person performing a behavior, they are able to develop their self-efficacy for their ability to perform the behavior.
However, there are also concerns with this manipulation because a large number of the modeling studies were done with clinical populations. For example, Bandura has performed several studies using modeling as a way to increase self-efficacy with individuals who had severe snake phobia (Bandura, 1969; Bandura & Adams, 1977; Bandura, Reese, & Adams, 1982). That is, individuals with snake phobia first observe individuals interacting with snakes and then are told to visualize interacting with the snake. Across these studies, Bandura and colleagues found that modeling influenced individuals' self-efficacy and that those with higher self-efficacy were able to engage in more snake handling tasks. However, there are at least three issues with these studies. First, the modeling procedure used by Bandura and colleagues is very similar to exposure therapy, which is an effective treatment for phobias (Wolitzky-Taylor, Horowitz, Powers, & Tech, 2008). Second, modeling is a form of training, providing information about how to go about doing something. Thus, modeling as a manipulation has the same potential problem that training in general has as a manipulation: it might affect capacity as well as belief in capacity.

Perhaps most importantly for the current study, the third issue is that the individuals in the phobia studies had extremely low self-efficacy. In fact, their self-efficacy was so low that they were seeking psychological treatment for a diagnosed mental disorder. However, most individuals do not have such low levels of self-efficacy. In fact, it appears that most individuals are overconfident about their ability in a variety of different domains (Dunning, Heath, & Suls, 2004). Therefore, to use the phobia

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1 Exposure therapy works by exposing individuals to small levels of thing they have a phobia about. For example, first you show people pictures of snakes, then a fake snake, then are present in a room with a snake and then finally hold a snake.
research as support for going into organizations and raising individuals’ self-efficacy raises external validity concerns. In particular, individuals with low levels of self-efficacy are likely to be on the left side of Figure 2, where no resources are allocated. Manipulations that move them to the right (i.e., increase self-efficacy) can only lead to an increase in resource allocation (i.e., motivation). In contrast, if individuals begin in the middle or higher end of the scale, then moving them higher is more likely to result in lowers resources allocated. Thus, studies focusing on increasing the self-efficacy of low self-efficacy individuals are not likely to generalize to conditions where many have middling to high self-efficacy from the start.

There are a number of experimental studies that use self-efficacy manipulations that are not tied to training or modeling. For example, Cervone and Peak (1986) appeared to cleanly manipulate self-efficacy. They told individuals to choose a random number from a bag and write the number at the top of a set of math problems that they were going to attempt to answer. However, the numbers were not random. Individuals pulled either a high number (18) or a low number (4). They were then asked to indicate how many math problems they believed they could solve. Individuals who pulled a higher number indicated that they could solve more math problems than individuals who pulled a lower number, on average. In addition, individuals who pulled a higher number persisted longer on a set of difficult and unsolvable math problems. This highlights the malleability of self-efficacy, which is another reason management researchers have suggested self-efficacy has much potential as a motivating construct (Gist & Mitchell, 1992).
Although it appears self-efficacy and only self-efficacy was manipulated, there are a few issues regarding this study. First, the self-efficacy manipulation could have created the goals individuals strived for and therefore the relationship between self-efficacy and performance was due to the indirect goal route. That is, individuals who chose the high number could have used this information as the goal for how many problems they should solve. More importantly, the dependent variable was disengagement. Disengagement is the notion that one give up on the goal. That is, they determine it is too difficult to proceed and thus no longer choose to accept the goal. Hence, the study appears to be about testing the indirect, goal choice process.

A study by McNatt and Judge (2004) is particularly relevant for the current study because it used a non-training self-efficacy intervention in an organization, which tested the relationship between self-efficacy and performance. McNatt and Judge provided a random sample of accountants with a 15-minute self-efficacy boosting intervention. In the intervention, they provided veridical positive feedback to the individuals in the high self-efficacy condition by selectively using positive information from their employment file. Individuals in the control group were asked questions about themselves and their jobs. All individuals knew that their performance was being measured. They then measured job performance each month for three months. McNatt and Judge (2004) found that the intervention had a positive relationship with job performance after the first month, but the effect disappeared thereafter.

Although, the intervention was effective for increasing performance in the first month, there are a number of concerns with the study. The feedback provided in the self-
efficacy intervention could have been more than just a self-efficacy boost. Specifically, they were told that the organization was committed to them and that although their work would be difficult, they were going to succeed. This could send a signal to the individual of strong organizational support and therefore the individuals worked harder to please the organization as a form of reciprocation for their support. In addition, they only manipulated self-efficacy in one direction and did not test the influence of deflated self-efficacy on performance. Therefore, they do not know what effect lowering self-efficacy could have on performance. It could be possible that if individuals were told that they were not performing well, this could motivate individuals to work harder to change these perceptions. In control-theory terms, there would be a large discrepancy between their current state and their desired state of a productive worker. If the discrepancy was not too large, this might motivate individuals to work harder.

There were also some statistical issues with the study. The authors do not report initial levels of self-efficacy for the experimental and control group, nor do they report whether they are statistically significantly different from one another prior to the manipulation (Time 1). Because of these limitations, there is not a clear understanding of how a non-training self-efficacy intervention will influence performance.

**Within-person repeated-measures studies.** In response to the issues of cross-sectional passive observational studies, and the potential confounds in manipulation studies, some researchers have used within-person designs to examine the influence of self-efficacy on motivation and performance.
These researchers have tended to take a control-theory based view of self-regulation because this view focuses on within-person change rather than between-person differences (Lord et al., 2010). In particular, Vancouver and colleagues (e.g., Vancouver et al., 2001) developed various protocols that provide insights into how self-efficacy is changing and influencing motivation within the person. In these studies, individuals are exposed to a number of trials where their motivation, performance, and self-efficacy are measured. The data is analyzed at the within-person level of analysis. Typically, these studies show that past performance is positively related to self-efficacy, but that self-efficacy exerts either a slight negative or null effect on subsequent performance. However, at the between level of analysis, they find the typical positive relationship between self-efficacy and performance. The reason there is a between-person positive relationship between self-efficacy and performance is because, as stated, there are between-person differences on ability and the self-efficacy measures are picking up these differences in ability.

For example, Vancouver et al. (2001) used a within-person, repeated-measures design where individuals received veridical feedback about their performance. In the first study described in the paper the researchers found that self-efficacy and goals were strongly and positively related to performance on the previous trial, but negatively related to performance on the next trial. In a second study reported in that paper, an easy or difficult goal was assigned to individuals halfway through the study. Those in the difficult goal condition were more likely to adopt the assigned difficult goal if they had higher self-efficacy and these individuals perform better than those in the easy goal.
condition or those who did not adopt the difficult goal. However, both before and after the goal manipulation, Vancouver et al. found the same negative effect for self-efficacy on subsequent performance at the within-person level.

In a follow-up paper that reported two additional studies, Vancouver et al. (2002) found that self-efficacy negatively related to future performance within the individual. In the first study, they manipulated self-efficacy via bogus performance feedback at the within-person level. In their second study, they let self-efficacy vary naturally, and found that self-efficacy lead to cognitive errors, which led to decreases in performance. Other researchers using a similar design have found similar results as these (Yeo & Neal, 2006; Schmidt & DeShon, 2009; 2010).

In an attempt to reconcile conflicting findings regarding self-efficacy, Vancouver et al. (2008) tested four different empirical models of the self-efficacy relationship with motivation, the positive, negative, inverted-U, and non-monotonic discontinuous). The inverted-U model is no longer widely discussed in the literature but originated in Atkinson’s (1957) achievement motivation theory. The theory predicts that if an individual accomplishes a task that is expected to be more difficult they will find greater achievement than if they succeed on a task they expect to be easy. Therefore, the relationship is curvilinear. The model is often tested in regards to individual differences in achievement motivation, and only success or failure as an outcome.

Vancouver et al. only found support for a non-monotonic, discontinuous relationship between self-efficacy and motivation. That is, individuals chose not to engage goals that they believed they had little chance to achieve, allocated many
resources towards goals that they believed were difficult but still possible, and allocated few resources towards goals they knew they could easily achieve. This study provides support for the idea that self-efficacy is both positively and negatively related to motivation, but the goal process must be taken into account. During goal choice, self-efficacy positively relates to motivation, but during goal striving or planning, it can negatively related.

The negative effect has not just been found with mental games. Woodman, Akerhurst, Hardy, and Beattie (2010) examined the influence of self-doubt in a physical exercise task (i.e., jump roping). Individuals were randomly assigned to either a control group or a self-doubt condition. In the self-doubt condition, individuals were told after their practice round that during the competition phase they would be using a different rope that would be more difficult to use and could interfere with their performance because it was a different weight. They found that individuals in the self-doubt condition had a significant decrease in self-confidence and a significant increase on performance from the practice trial to the competition trial. In a different study that used a putting task, Beattie, Lief, Adamoulas, and Oliver, (2011) found that self-efficacy had a weak, non-significant, negative relationship with subsequent performance across two experiments with novice golfers learning to putt. Research regarding the preparatory context in academics also supports the prediction of a negative effect.

Although not directly about self-efficacy, Mueller and Dweck (1998) conducted a study that investigated how beliefs in one’s ability can influence motivation and performance. Mueller and Dweck randomly assigned fifth grade students to either receive
praise for their effort or praise for their natural ability (i.e., intelligence) for their performance on education tasks. Individuals who were praised for their ability persisted less on a task after failure, had less enjoyment, and had worse performance than individuals who were praised for their effort. A reasonable interpretation of these results is that those in the praise for ability condition believed they had strong ability and therefore did not need to work as hard because they believed they could get by with their superior ability. This study supports the contention that if individuals believe they have high ability they may become less motivated. The Mueller and Dweck (1998) study shows that if elementary students falsely believe they have high ability, they will not work as hard and will perform worse. Because this study was done with children, there are issues about the generalizability of this study to adults. In addition, it was not directly about the influence of self-efficacy on motivation and performance. However, Vancouver and Kendall (2006) conducted a within-person, longitudinal investigation of the influence of self-efficacy on motivation and performance in a preparatory learning context.

Vancouver and Kendall (2006) used a classroom sample and measured self-efficacy, planned study time, exam grade goal, and exam performance throughout the academic term. They found that self-efficacy was significantly negatively related to motivation (i.e., planned study time). In addition, self-efficacy was significantly negatively related to performance (exam grades) at the within-person level of analysis. However, the effect was very small and in a subsequent reanalysis of the data (Bandura, 2012), the effect on performance lost significance.
Although Bandura (1997) acknowledges that self-efficacy may not be positively related to motivation and performance in preparatory contexts like those often found in academics, he rejects the findings from Vancouver and Kendall because of the “deficient assessment of self-efficacy” (Bandura, 2012). In addition, Bandura rejects the idea that educators should lower individuals’ self-efficacy to get them to learn. However, the study by Woodman et al. (2010) indicates that in a sports context an intervention to lower individuals’ self-efficacy may be beneficial. Therefore, the purpose of the current study is to examine the influence of a self-efficacy intervention on motivation and performance in an educational context. Individuals will either have their self-efficacy deflated or inflated. Based on the results from Vancouver and Kendall (2006) and Woodman et al. individuals who have their self-efficacy deflated should plan to study more because they believe their ability is low. Individuals who have their self-efficacy inflated should plan to study less because they believe their ability is high. In contrast, those who have their self-efficacy deflated should perform better on the exam than those who had their self-efficacy inflated.
Present Study

The goals of the current study are threefold. One goal is to provide causal evidence about the role of self-efficacy on motivation and performance in an applied context. The second goal is to have a better understanding of how self-efficacy, goals, motivation, and performance change over time. The third is to test a simple intervention for improving motivation to study and hence performance in an academic setting. To overcome the limitations of previous research on self-efficacy in regards to motivation and performance, I have integrated the methodological approach advocated by Vancouver et al. (2001; 2002; 2006; 2008), which uses a repeated-measures, within-person design, with a self-efficacy intervention. The current study will investigate the influence of a self-efficacy intervention on motivation and performance during a second exam in a course and will examine self-efficacy, motivation, and performance before the self-efficacy intervention, during the intervention, and after the intervention for all subsequent exams.

Self-Efficacy Intervention

Individuals will be randomly assigned to one of two groups. One group (inflated self-efficacy) was given a practice exam two days before the exam with easy practice problems from the material presented in class and a message at the top of the practice exam that states, “Individuals are often worse at understanding this material than they think they are”. The other group (deflated self-efficacy) was given a practice exam with difficult practice problems from the material presented and a message at the top of the practice exam that states, “Individuals are often better at understanding this material than
they think they are.” Individuals had access to the answers to the practice exam, which provided them with accurate feedback about their performance on the practice exam.

Therefore, those in the deflated self-efficacy condition should have expected the upcoming exam to be more difficult because they were provided with a difficult preview. However, those in the inflated self-efficacy condition should have expected the upcoming exam to be easier because they were provided with a preview where they easily answered the practice questions.

In the preparatory context, Bandura (1997) states that self-efficacy could be negatively related to motivation and possibly performance (although he seems to have backed away from this more recently; see Bandura, 2012). In addition, Vancouver (2008) theorizes that once a goal is accepted self-efficacy will be negatively related to motivation during planning. Therefore, I hypothesized that individuals who were given a more difficult practice exam would have lower self-efficacy, would plan to study more for the exam, and would perform better on the exam.

**Hypothesis 1a:** Individuals given more difficult practice problems will have lower levels of self-efficacy than individuals given easier practice problems.

**Hypothesis 1b:** Individuals given more difficult practice problems will plan to study more for the exam than individuals given easier practice problems.

**Hypothesis 1c:** Individuals given more difficult practice problems will perform better on the exam than individuals given easier practice problems.

**Hypothesis 2a:** Self-efficacy will be negatively related to planned study time.

**Hypothesis 2b:** Self-efficacy will be negatively related to exam performance.
Dynamics of Self-Efficacy throughout the Semester

Vancouver et al. (2001; 2002; 2006; 2008) have highlighted the importance of examining self-efficacy within the individual because the within-person approach can determine temporal precedence and can control for stable individual differences by controlling for the covariance between persons. Therefore, using this approach provides insights about how self-efficacy is influencing motivation and performance over time. As stated previously, understanding the dynamics within a person has become a focal goal of the self-regulation literature (Lord et al., 2010). In addition to examining within-person change before the intervention, during the intervention, and after the intervention, I also investigated between person differences across the semester.

Within-person change. In an educational setting, individuals use their self-efficacy beliefs to determine how much they should prepare for an upcoming exam (Bandura, 1997; Vancouver & Kendall, 2006). Therefore, I hypothesized that when an individual’s self-efficacy is low they will study more than when their self-efficacy is high because they believe they will not perform well on the exam. When an individual’s self-efficacy is high, I hypothesized that they will study less because they have a belief that they are prepared for the exam. A large body of research has shown that individuals are often overconfident about their ability (Dunning et al., 2002). Therefore, I predicted that when an individual’s self-efficacy belief is high he or she would plan to study less for the upcoming exam. Because the belief is likely miscalibrated, self-efficacy will negatively related to performance.
**Hypothesis 3a:** Within the person, self-efficacy will negatively relate to planned study time.

**Hypothesis 3b:** Within the person, self-efficacy will negatively relate to performance.

**Between-person differences (cross-sectional relationships).** Consistent with previous research at the between-person level of analysis, I predicted that self-efficacy will positively relate to performance. Based on previous research (Vancouver & Kendall, 2006; Yeo & Neal, 2006), I predicted that this positive relationship is a function of individual differences. Specifically, inside the classroom there is variance between students on intelligence and academic knowledge. Therefore, individuals who have higher intelligence and academic knowledge should have higher self-efficacy and should perform better. In addition, Vancouver and Kendall (2006) found that self-efficacy negatively related to planned study time at the between-person level. Although the effect was non-significant, this is likely the result of the small sample size in the study. Therefore, I predicted that individuals with higher levels of self-efficacy would plan to study less for an upcoming exam because they have a higher belief in their ability. Although, not a formal hypothesis, I predicted that when ability is controlled, the relationship between self-efficacy and performance will decrease.

**Hypothesis 4a:** Between persons, individuals with higher self-efficacy will plan to study less for the upcoming exam.

**Hypothesis 4b:** Between persons, individuals with higher self-efficacy will perform better on the exam.
Method

Context and Participants

The current study was conducted in a large introductory psychology course where four exams worth 50 points each were used to determine grades. A possible 415 students could have participated in the study. To incentivize students to participate in the study, a practice exam was provided for each survey. In addition, some who logged onto the website to take the survey only took the practice exams and did not fill out additional material. Individuals were removed from the analysis if they were missing two or more data points in regards to self-efficacy. For Exam 1 there were 78 students, Exam 2 had 68 students, Exam 3 had 39 students, and Exam 4 had 36 students.

The sample consisted of students in an introductory psychology course. Of those participating in the study 56% were female, 48% were freshman students, 86% were Caucasian, the mean age was 19.01 and 63% of the sample had at least one year of work experience.

Procedure and Manipulation for Exam 2

Two days before each exam, participants were given a questionnaire that measured their planned study time; course goal grade; exam goal grade; and self-efficacy (see measures and Appendix A). Individuals completed the questionnaire online.

Two days before the second exam, participants were randomly assigned to either a practice exam that contained difficult or easy practice problems and a motivational message. The instructor for the course created two practice exams of varying difficulty based on book publisher recommendations and personal experience of the instructor with
the items in the past. The practice exams for each of the surveys consisted of 15 multiple-choice questions that were similar to the real exam.

Individuals in the low self-efficacy condition received more difficult practice problems and the message, “Individuals are often worse at understanding this material than they think they are.” Individuals in the high self-efficacy condition received easier practice problems and the message, “Individuals are often better at understanding this material than they think they are.” After the practice problems, individuals were asked about their course goals, exam goal, self-efficacy, and planned study time.

The intervention was only performed on the second exam. After the second exam the procedure for administration of the questionnaires was the same as on the first exam.

**Measures**

**Exam goal-level.** Consistent with previous research on assessing goals and assessing goals in an educational setting (Lock & Latham, 1990; Wood & Locke, 1987), participants were asked four questions about their exam goal grade. These questions were aggregated to create one single “goal-construct” (Wood & Locke, 1987). The combined goal measure exhibited good reliability ($\alpha = .81$). Participants were asked “What grade are you really aiming for on the upcoming exam?”, “What grade are you actually trying for on the upcoming exam?”, “What grade do you expect to get on the upcoming exam?”, and finally “What is lowest academic grade on the exam that you would find satisfying?” For each question the same response format was used: 1 = F, 2 = D, 3 = C, 4 = B, and 5 = A.
**Self-efficacy.** Consistent with Bandura (1997; 2012) and others (Lee & Bobko, 1994; Wood & Locke, 1987) self-efficacy was assessed using both the strength and magnitude measures. Individuals first indicated if they could achieve at least a certain level of performance (strength measure). For example, “Can you get at LEAST a D on the upcoming exam?” Then individuals were asked, “On a scale from 0-100% how confident are you that you can get at LEAST a D (60-69%)” (magnitude measure). They were asked for each letter grade.

These two measures were combined to create a composite measure. The composite measure sums the strength measure for every “Yes” answer in the magnitude measure. The composite measure correlates highly with other measures of self-efficacy and self-set goals (Lee & Bobko, 1994). The scale exhibited good reliability ($\alpha = .86$).

**Resource allocation.** To measure resource allocation individuals were asked about their planned study time. Specifically, individuals were asked, “How long do you plan to study for the upcoming exam?” Possible responses were 30 minutes (1) to 5 hours or more (10) in 30-minute increments.

**Performance.** Performance was measured using their actual exam grades. All exams were out of 50 points.

**Ability.** Ability was measured by having individuals self-report their ACT scores. ACT scores can be found on their academic records, which the students were able to access online and a link to the website to get the records was provided in the survey.
Analysis

To examine the hypotheses, analyses were conducted at both the between and within level of analysis. In addition, analyses were conducted at the between level for the experimental manipulation. Based on previous research (Lock & Latham, 1990; Vancouver & Kendall, 2006) self-efficacy has been shown to positively relate to goals and therefore all analyses were performed with and without goal level as a control.

Tests for the first set of hypotheses. To test for the effect of experimental condition on self-efficacy, planned study time, and performance, an omnibus MANOVA was performed. It was hypothesized that those in the low self-efficacy condition will have lower self-efficacy (Hypothesis 1a), will plan to study more (Hypothesis 1b), and will perform better on the exam (Hypothesis 1c).

Testing the second set of hypotheses. In the second set of hypotheses, self-efficacy was correlated with planned study time and performance on the second exam.

Testing the third set of hypotheses. Hierarchical linear modeling (Bryk & Raudenbush, 1992) was used to investigate changes in goals, self-efficacy and performance over time. Hierarchical linear modeling (HLM) correctly models data with correlated errors, such as repeated measures. HLM creates multilevel regression equations for each participant in the sample with the Level-1 equation being the within-person effects and the resulting regression coefficients are regressed on the Level-2 equation, which are the between-person effects. When using HLM, it is customary to center the data (Bryk & Raudenbush, 1992) and therefore for all analyses done with HLM the data is group centered to improve interpretability.
Vancouver and Kendall (2006) found that exam order had a significant effect on performance. Therefore, exam order was entered as a control variable when significantly related to the dependent variable. In addition, all analyses were performed controlling and not controlling for goal-level. To test the hypothesis that self-efficacy has a negative effect on planned study time (Hypothesis 3a); the effect of self-efficacy on planned study time was examined. Finally, to test the hypothesis that self-efficacy has a negative effect on performance (Hypothesis 3b); the effect of self-efficacy on performance was examined.

Testing the fourth set of hypotheses. Between person analyses are conducted by aggregating the data across time. Correlations are then used to examine the relationship between self-efficacy, planned study time (Hypothesis 4a), performance (Hypothesis 4b), and goals. Mediation analysis with bootstrapping (Preacher & Hayes, 2004) was conducted to examine the indirect effect of self-efficacy through goals (Figure 3. To test for mediation, I followed Baron and Kenny (1986) and first regressed self-efficacy on exam performance. Then I regressed self-efficacy on exam goals. Finally, I regressed exam goals on exam performance controlling for self-efficacy. An assumption of these tests (i.e. direct and indirect tests) is multivariate normality. However, Preacher and Hayes (2004) state that this assumption is often violated and therefore bootstrapping should be used to test for the significance of the indirect effect \( ab \). Bootstrapping calculates the indirect effects by sampling with replacement from the original sample, \( k \) times \( (k = 20,000) \). Therefore, the indirect effect \( ab \) is the mean \( ab \) over 20,000
samples. In addition, goals and ability were controlled to test for the direct effect of self-efficacy on performance (Bandura, 1997).

Figure 3. Proposed mediation model
Results

Descriptive Statistics

Table 1 provides descriptive statistics for exam grade, ACT, planned study time, exam goal, course goal and self-efficacy broken down by each exam and in the aggregate. Table 2 contains the correlations between the key variables and Interclass Correlations.

Table 1
Descriptives on Key Variables by Exam and Aggregated Across Exams

<table>
<thead>
<tr>
<th>Exam Order</th>
<th>N</th>
<th>Mean</th>
<th>SE</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exam Performance</td>
<td>1</td>
<td>78</td>
<td>37.19</td>
<td>0.63</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>68</td>
<td>39.56</td>
<td>0.68</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>39</td>
<td>38.31</td>
<td>1.06</td>
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<td></td>
<td>4</td>
<td>36</td>
<td>40.64</td>
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</tr>
<tr>
<td>Aggregated</td>
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<td>38.5</td>
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<td>Planned Study Time</td>
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<td>7.13</td>
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<tr>
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<tr>
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<td>56.49</td>
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Table 2
ICCs (in diagonals) and Between-Person Correlations Among Study Variables

<table>
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<th></th>
<th>Exam Performance</th>
<th>ACT</th>
<th>Planned Study Time</th>
<th>Exam Goal</th>
</tr>
</thead>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>.49**</td>
<td>(.98)</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>-.07</td>
<td>(.82)</td>
<td></td>
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<td>.43**</td>
<td>-.08</td>
<td>(.82)</td>
</tr>
<tr>
<td>Self-Efficacy</td>
<td>.43**</td>
<td>.25**</td>
<td>-.10</td>
<td>.69**</td>
</tr>
</tbody>
</table>

** p < .01

Interclass correlations were calculated using a one-way random effects model to examine the proportion of between-persons relative to within-person variance (McGraw & Wong, 1996). As can be seen in Table 2, most of the variance is between individuals rather than within-person. Vancouver and Kendall (2006) found slightly more within-person variance in their student sample.

To test for differences on the main dependent variables as a function of number surveys individual took, I performed a MANOVA on exam performance, ACT, planned study time, exam goal, and self-efficacy by number of surveys. The only significant difference on any of the dependent variables was for planned study time (Table 3).
Table 3
**MANOVA Table: The Effect of Number of Surveys on Exam Performance, ACT, Planned Study Time, Exam Goal and Self-Efficacy**

<table>
<thead>
<tr>
<th>Source</th>
<th>Dependent Variable</th>
<th>MS</th>
<th>F</th>
<th>df/s</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surveys</td>
<td>Exam Performance</td>
<td>12.53</td>
<td>0.37</td>
<td>3</td>
<td>0.77</td>
</tr>
<tr>
<td></td>
<td>ACT</td>
<td>4.28</td>
<td>0.40</td>
<td>3</td>
<td>0.75</td>
</tr>
<tr>
<td></td>
<td>Planned Study Time*</td>
<td>15.73</td>
<td>2.78</td>
<td>3</td>
<td>0.04</td>
</tr>
<tr>
<td></td>
<td>Exam Goal</td>
<td>0.15</td>
<td>0.51</td>
<td>3</td>
<td>0.68</td>
</tr>
<tr>
<td></td>
<td>Self-Efficacy</td>
<td>905.77</td>
<td>1.85</td>
<td>3</td>
<td>0.14</td>
</tr>
<tr>
<td>Error</td>
<td>Exam Performance</td>
<td>33.51</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ACT</td>
<td>10.71</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Planned Study Time</td>
<td>5.66</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exam Goal</td>
<td>0.30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Self-Efficacy</td>
<td>490.14</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. *p < .05

In regards to planned study time, pairwise comparisons were performed across number of exams using a Bonferroni correction. Those who completed surveys for four exams (\(M = 8.00, SD = 2.47\)) significantly (\(t = 2.74, p = .038\)) planned to study more than those who complete surveys for three exams (\(M = 6.21, SD = 2.36\)).

**Hypothesis Tests**

The first set of hypotheses is in reference to the intervention performed during the second exam. A manipulation check was performed to test whether those in the low self-efficacy condition (more difficult practice exam) scored lower on the practice exam. This was not the case, \(F(1, 67) = 1.84, p = .180\). Indeed, individuals who were given a difficult practice exam (\(M = 11.63\)) did better than those who were given the easier practice exam (\(M = 10.70\)).

To examine the effect of the self-efficacy intervention on self-efficacy, planned study time, and exam performance, an omnibus MANOVA was tested. It was
hypothesized that those given the more difficult practice exam would have lower self-efficacy (Hypothesis 1a), plan to study more (Hypothesis 1b), and would perform better on the exam (Hypothesis 1c). However, the omnibus MANOVA (Table 4) revealed that condition did not have a significant effect on any of the dependent variables. In addition, controlling for goal-level did not significantly affect the results.

Table 4
MANOVA Table: The Effect of Condition on Exam Performance, Planned Study Time and Self-Efficacy

<table>
<thead>
<tr>
<th>Source</th>
<th>Dependent Variable</th>
<th>MS</th>
<th>F</th>
<th>dfs</th>
<th>p</th>
<th>η²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition</td>
<td>Exam Performance</td>
<td>44.36</td>
<td>1.47</td>
<td>1</td>
<td>0.23</td>
<td>0.023</td>
</tr>
<tr>
<td></td>
<td>Planned Study Time</td>
<td>0.12</td>
<td>0.03</td>
<td>1</td>
<td>0.87</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Self-Efficacy</td>
<td>118.28</td>
<td>0.25</td>
<td>1</td>
<td>0.62</td>
<td>0.004</td>
</tr>
<tr>
<td>Error</td>
<td>Exam Performance</td>
<td>30.18</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Planned Study Time</td>
<td>4.42</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Self-Efficacy</td>
<td>471.83</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. N = 65; Condition (0 = Easy; 1 = Difficult)

Individuals who received the difficult practice exam had slightly lower self-efficacy ($M = 59.84, SD = 20.21$) than those who received the easy practice exam ($M = 62.54, SD = 23.37$). In regards to planned study time, there was no difference between those received the difficult practice exam ($M = 5.69, SD = 1.94$) compared to those who received the easy practice exam ($M = 5.60, SD = 2.28$). Finally, those who received the difficult practice exam did slightly better on the actual exam ($M = 40.80, SD = 5.47$) than those who received the easy practice exam ($M = 39.14, SD = 5.52$). Because planned study time was unrelated to performance (Table 1) and condition was unrelated to
performance (Table 4), I did not test for the incremental variance of condition over planned study time on performance.

To test the second set of hypotheses, self-efficacy was correlated with planned study time and exam performance. In addition, the partial correlation controlling for goal was tested. Hypothesis 2a was not supported. Self-efficacy was not significantly related to planned study time ($r = -.01, p > .05$). In addition, Hypothesis 2b was not supported. Self-efficacy was significantly positively related to exam performance ($r = .33, p < .01$). However, when exam goal was controlled this correlation was no longer significant ($r = .09, p > .05$).

The third set of hypotheses refers to within-person change across the semester. I first checked to see if exam order had an effect on planned study time. Exam order was unrelated to planned study time ($p = .45$). Therefore, exam order was not controlled when testing the within-person hypotheses on planned study time. Because not all students took all four surveys, I only included those in the analysis who completed surveys for at least two exams. Including individuals who only completed surveys for one exam is inappropriate because these hypotheses refer to change occurring within-person. To test Hypothesis 3a, self-efficacy was regressed on planned study time. It was predicted that self-efficacy would be negatively related to planned study time within-person. Hypothesis 3a was not supported. Self-efficacy was non-significantly negatively related to planned study time (Table 5). When goal level was controlled, self-efficacy was still unrelated to planned study time.
Before testing Hypothesis 3b, I tested to see if exam order had an effect on exam performance. Exam order was significantly positively related to exam performance (Table 5). Therefore, Hypothesis 3b is tested controlling for exam order, which is consistent with Vancouver and Kendall (2006). Hypothesis 3b was not supported. Self-efficacy was non-significantly positively related to exam performance (Table 5). Because there would not be enough degrees of freedom, when goals were also controlled, exam order was left out of the equation. However, this did not change the results (Table 5). Overall, Hypothesis 3a and 3b were not supported. Self-efficacy had no effect on either planned study time or exam performance within-person.

The final set of hypotheses referred to the between-person effects of self-efficacy on planned study time and exam performance. At the between-person level of analysis, it was predicted that self-efficacy would be negatively related to planned study time (Hypothesis 4a). This hypothesis was not supported (Table 2). Self-efficacy was not significantly related to planned study time ($r = -.10, p > .05$). In addition, it was also

<table>
<thead>
<tr>
<th>Step</th>
<th>Goal Not Controlled</th>
<th>Goal Controlled</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>γ</td>
<td>SE</td>
</tr>
<tr>
<td>Planned Study Time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Goal</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>1. Self-Efficacy</td>
<td>-0.002</td>
<td>0.01</td>
</tr>
<tr>
<td>Exam Performance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Exam Order</td>
<td>0.903**</td>
<td>0.32</td>
</tr>
<tr>
<td>2. Goal</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>2. Self-Efficacy</td>
<td>0.014</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Table 5
Within-Person Analysis using HLM

Note. df = 45. ** p < .01. Step indicates the entry into the HLM. When more than one variable is entered in a step that indicates that they were entered together.
predicted that self-efficacy would be positively related to exam performance. This hypothesis was supported (Table 2). Self-efficacy was positively related ($r = .43, p < .01$) to exam performance.

To test for the indirect effect of self-efficacy on exam performance through goals, mediation analysis was conducted using the Preacher and Hayes (2004) bootstrapping approach with 20,000 bootstrap resamples (Figure 3). The relationship between self-efficacy and exam performance is mediated by exam goals (Table 6). Therefore, self-efficacy has an indirect effect on exam performance through goals.

Bandura (1997) has proposed that self-efficacy also has a direct effect on performance above goals and ability. Therefore, both goals and ability were controlled to test the direct effect. I tested the relationship between self-efficacy and performance when ability (i.e. ACT) and goals were controlled. When both goals and ability are controlled, self-efficacy was unrelated to exam performance (Table 7). These findings are consistent with the view that self-efficacy is only operating on performance through goals.
### Table 6

**Mediation Results**

<table>
<thead>
<tr>
<th>Path</th>
<th>Coefficient</th>
<th>SE</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>0.018</td>
<td>0.002</td>
<td>11.62</td>
<td>0.001</td>
</tr>
<tr>
<td>b</td>
<td>3.91</td>
<td>1.018</td>
<td>3.85</td>
<td>0.001</td>
</tr>
<tr>
<td>c'</td>
<td>0.05</td>
<td>0.026</td>
<td>1.86</td>
<td>0.065</td>
</tr>
</tbody>
</table>


### Table 7

**Regression Analysis Controlling for Goal and Ability**

<table>
<thead>
<tr>
<th>Step</th>
<th>Predictor</th>
<th>B</th>
<th>t</th>
<th>p</th>
<th>R</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Exam Goal</td>
<td>0.385</td>
<td>4.9</td>
<td>0.001</td>
<td>0.59</td>
</tr>
<tr>
<td></td>
<td>ACT</td>
<td>0.314</td>
<td>4.0</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Exam Goal</td>
<td>0.272</td>
<td>2.62</td>
<td>0.01</td>
<td>0.60</td>
</tr>
<tr>
<td></td>
<td>ACT</td>
<td>0.321</td>
<td>4.11</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Self-Efficacy</td>
<td>0.16</td>
<td>1.64</td>
<td>0.103</td>
<td></td>
</tr>
</tbody>
</table>

Note. N = 131
Discussion

The role of self-efficacy in motivation and performance has been subject of great debate in the literature (Bandura, 2012; Bandura & Locke, 2003; Vancouver, 2012; 2005). The current study attempted to address key issues regarding self-efficacy using an experimental intervention of self-efficacy. However, the experimental intervention was unable to change students’ self-efficacy. Yet, the passively observed variables, which were analyzed at between-person and within-person levels of analyses, largely revealed similar results as previous studies.

Theoretical Implications

In social cognitive theory, the main mechanism for motivation and performance is self-efficacy. Self-efficacy can either have a direct effect on performance or an indirect-effect through goals. In regards to a preparatory context, Bandura (1997) has claimed that self-efficacy may be negatively related to motivation and performance. Although, Bandura (2012) appears to back off from this statement, and proposes that self-efficacy should be positively related to motivation and performance in the preparatory context.

At the within-person level of analysis, self-efficacy was unrelated to planned study time and exam performance. In addition, goals were unrelated to planned study time and exam performance at the within-person level. Finally, there was more variance between individuals than within individuals, which could indicate that self-efficacy beliefs are relatively stable.

At the between-person level, the current study only supports the indirect effect of self-efficacy on performance. Goals mediated the relationship between self-efficacy and
exam performance. Therefore, individuals that have higher beliefs in their ability set higher goals, which results in better performance. Bandura (1997) also claims that self-efficacy can have a direct effect on performance. However, when ability and goals were controlled, self-efficacy was no longer related to performance. These results support claims by Vancouver et al. (2012) that in most situations self-efficacy operates through goals.

Control-theory based self-regulation fared better than social cognitive theory in the current study. Vancouver (2008) proposed that self-efficacy should be positively related to goal-choice, but negatively related to resource allocation. The current results indicate that self-efficacy is positively related to goals, but unrelated to resource allocation and performance. These results are consistent with studies by Vancouver et al. (2001; 2002; 2006; 2008) who found that self-efficacy is either unrelated to performance, or slightly negatively related to performance. Indeed, when Vancouver et al. (2012) reviewed the literature on self-efficacy, they proposed that self-efficacy should have little effect on performance and that any effect it does have is through goals. The current results do not support the control-theory prediction that self-efficacy is negatively related to resource allocation. In the current study, at both the within-person level and between-person level, self-efficacy was unrelated to planned study time, which was the measure of resource allocation.

Training Implications

Previous intervention studies regarding self-efficacy have been directly tied to training (Gist & Mitchell, 1982). This often meant that one group received training and
the other group received no training or inadequate training. However, this creates problems because capacity is also manipulated. Based on previous theoretical propositions (Gist and Mitchell, 1982) and empirical results (Cervone & Peake, 1986) that self-efficacy is easily malleable; I attempted to manipulate self-efficacy using a difficult and easy practice exam. The practice exam was meant to give participants an indication of what to expect for the upcoming exam. Therefore, those who received the difficult practice exam should have expected a difficult exam and should have had lower beliefs about their ability. However, the manipulation was not effective in changing individuals’ self-efficacy. The low fidelity of the manipulation is likely a result of difficulty in developing a manipulation that was not so strong it made students disengage from the exam because of their expectations. Disengagement could have occurred if the practice test was either too difficult or too easy. In the case of a too difficult exam, students may not study because they believe it will not make a difference on their performance. The same could be true in regards to an easy practice test. If the practice test is extremely easy, the students may believe there is no need to study. Striking a balance between too easy and too difficult resulted in practice exams that did not produce differences in self-efficacy. Therefore, the effect of a self-efficacy manipulation not tied to training is inconclusive regarding its effect on motivation and performance in the classroom.

Gist and Mitchell (1992) proposed that because self-efficacy is positively related to performance and self-efficacy is easy to manipulate, trainers should increase workers’ self-efficacy resulting in better performance. However, previous (Vancouver & Kendall,
and current results indicate that self-efficacy and goals do not change very much within-person. Therefore, changing individuals’ self-efficacy in a natural setting may be more difficult than assumed. In a training context, it may only be possible to get changes in self-efficacy when a change in ability occurs. In regards to goals, the relationship between self-efficacy and performance was mediated by goals. This indicates that those with higher self-efficacy set higher goals, which leads to better performance.

A conclusion one could draw from these results is that interventions that raise individuals’ self-efficacy will lead to higher goals and better performance. However, a number of issues need to be considered. First, this conclusion is based on self-efficacy and goals being passively observed and therefore causal conclusions are impossible. Secondly, ability is also related to goals. Therefore, individuals who have higher ability set higher goals than individuals who have lower ability on the task. Raising goals will only have a positive effect on performance if individuals’ ability on the task changes. If individuals are miscalibrated and set goals that are below their ability, an intervention that raises their beliefs in ability may be useful. However, if they are calibrated and set goals aligned with their ability, an intervention that raises their beliefs may result in worse performance because they have not changed their ability to reach these higher goals. Therefore, for a self-efficacy intervention to be effective, it must change ability in some way. This could be done directly through better training and thus actually changing ability. It could also be accomplished indirectly by changing individuals’ contingency beliefs about effort and performance. The indirect intervention would persuade individuals that if they put in more effort this will change their ability and will result in
better performance. Therefore, by putting in more effort, individuals are attempting to change their ability, which would lead to better performance. Whatever intervention is adopted, changes in actual ability need to occur to influence performance.

Limitations

Although, the current study attempted to rectify previous limitations regarding self-efficacy intervention studies, there are two major limitations with the current study. The biggest limitation of the current study is that the intervention lacked fidelity. There was no significant difference between the groups on the practice exam. Although the difficult exam was predicted to be more difficult than the easy exam, it was acknowledged by the instructor that the differences were not extreme.

Another limitation of the current study is lack of power. From personal teaching experience, students often ask for practice exams. Therefore, to incentivize students to take the surveys before each exam, the survey was tied to a practice exam. However, a large portion of students did not participate in the study and participation dropped off steadily for each exam. Therefore, the within-person analyses were limited because the majority of students did not participate in every survey, which makes it difficult to detect natural variation within-people in such a small sample of observations. The effect of exam order and self-efficacy on exam performance only had 20% observed power. Future studies using educational settings need to better incentivize students’ participation in the studies.
Summary

Self-efficacy has received a lot of scholarly attention in the organizational literature. The majority of this research has found that self-efficacy positively relates to performance and often positively relates to performance after goals have been controlled. The current study attempted to manipulate self-efficacy experimentally using an intervention not tied to training in a classroom sample. However, the intervention lacked fidelity and was unable to produce changes in self-efficacy. At the between-person level of analysis, self-efficacy was unrelated to planned study time, but positively related to exam performance. However, goals mediated the relationship between self-efficacy and performance, which supports the indirect effect of self-efficacy on performance. At the within-person level, self-efficacy was unrelated to planned study time and exam performance. Self-efficacy is malleable (Gist & Mitchell, 1996), important (Bandura, 1997) and controversial (Bandura, 2012; Vancouver, 2012). Therefore, future research needs to examine self-efficacy interventions using large-scale samples.
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theory of multiple-goal pursuit: Integrating goal-choice and goal-striving


Appendix A: Survey Items

Questionnaire before Exam 1,3,4

Please choose an option for each question. These questions refer to your overall course goal grade.

1. What grade are you really aiming for in this class?
   
   F  D  C  B  A

2. What grade do you expect to get in this class?
   
   F  D  C  B  A

3. What is lowest academic grade in this course that you would find satisfying?
   
   F  D  C  B  A

4. What grade are you actually trying for in this class?
   
   F  D  C  B  A
Please choose an option for each question. These questions refer to your grade goal for the upcoming exam.

1. What grade are you really aiming for on the upcoming exam?
   F D C B A

2. What grade do you expect to get on the upcoming exam?
   F D C B A

3. What is lowest academic grade on the upcoming exam that you would find satisfying?
   F D C B A

4. What grade are you actually trying for on the upcoming exam?
   F D C B A
Self-Efficacy

1. Please anticipate the letter grade you would receive if you took the test right now.

F                                D                                             C                          B                                       A

2. We are interested in how confident you are that you can get at LEAST a specific grade. First you will be asked if you can get at LEAST a certain letter grade. For example, “Can you get at LEAST a D on the upcoming examine. Then you will be asked how confident you are that you could get at LEAST a D.

If you took the test right now, could you get at LEAST a D on the upcoming exam?

Yes   No

On a scale from 0-100% how confident are you that you can get at LEAST a D if you took the test right now?

If you took the test right now, could you get at LEAST a C on the upcoming exam?

Yes   No

On a scale from 0-100% how confident are you that you can get at LEAST a C if you took the test right now?

If you took the test right now, could you get at LEAST a B on the upcoming exam?

Yes   No

On a scale from 0-100% how confident are you that you can get at LEAST a B if you took the test right now?

If you took the test right now, could you get at an A on the upcoming exam?

Yes   No

On a scale from 0-100% how confident are you that you can get at an A if you took the test right now?

3. How long do you plan to study for the upcoming exam? Please circle the amount of time that comes closes to the amount of time you plan to study for the exam.

About 30min  1 hour  1 ½ hours  2 hours  2 ½ hours  3 hours  3 ½ hours  4 hours  4 ½ hours  Longer than 4 ½ hours
Questionnaire and for Exam 2

Instructions:

Please answer the following question before starting the practice exam. Then please take the practice exam and fill out the additional questionnaires after you have completed the practice exam.

The following practice exam is for your benefit; it will help prepare you for the exam. There are also some questions at the end of the practice exam that ask about your goals and beliefs, which may help instructors facilitate learning in the future. Completion of these materials is voluntary. Note, the current instructor will not know if you did or did not complete these materials or what you indicated in the surveys. This is to obtain the most accurate responses possible.
Please choose an option for each question. These questions refer to your overall course goal grade.

5. What grade are you really aiming for in this class?
   - F
   - D
   - C
   - B
   - A

6. What grade do you expect to get in this class?
   - F
   - D
   - C
   - B
   - A

7. What is lowest academic grade in this course that you would find satisfying?
   - F
   - D
   - C
   - B
   - A

8. What grade are you actually trying for in this class?
   - F
   - D
   - C
   - B
   - A
Please choose an option for each question. These questions refer to your grade goal for the upcoming exam.

5. What grade are you really aiming for on the upcoming exam?
   F                                D                                      C                          B                                       A

6. What grade do you expect to get on the upcoming exam?
   F                                D                                      C                          B                                       A

7. What is lowest academic grade on the upcoming exam that you would find satisfying?
   F                                D                                      C                          B                                       A

8. What grade are you actually trying for on the upcoming exam?
   F                                D                                      C                          B                                       A
Self-Efficacy

4. Please anticipate the letter grade you would receive if you took the test right now.

F    D    C    B    A

5. We are interested in how confident you are that you can get at LEAST a specific grade. First you will be asked if you can get at LEAST a certain letter grade. For example, “Can you get at LEAST a D on the upcoming examine. Then you will be asked how confident you are that you could get at LEAST a D.

If you took the test right now, could you get at LEAST a D on the upcoming exam?

Yes  No

On a scale from 0-100% how confident are you that you can get at LEAST a D if you took the test right now?

If you took the test right now, could you get at LEAST a C on the upcoming exam?

Yes  No

On a scale from 0-100% how confident are you that you can get at LEAST a C if you took the test right now?

If you took the test right now, could you get at LEAST a B on the upcoming exam?

Yes  No

On a scale from 0-100% how confident are you that you can get at LEAST a B if you took the test right now?

If you took the test right now, could you get at an A on the upcoming exam?

Yes  No

On a scale from 0-100% how confident are you that you can get at an A if you took the test right now?

6. How long do you plan to study for the upcoming exam? Please circle the amount of time that comes closes to the amount of time you plan to study for the exam.

About 30min 1 hour 1 ½ hours 2 hours 2 ½ hours 3 hours 3 ½ hours 4 hours 4 ½ hours Longer than 4 ½ hours
**Practice Exam**

**Condition: Either easy or difficult. Practice test TBD.**

Please choose an option for each question. These questions refer to your overall course goal grade.

9. What grade are you really aiming for in this class?

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>D</th>
<th>C</th>
<th>B</th>
<th>A</th>
</tr>
</thead>
</table>

10. What grade do you expect to get in this class?

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>D</th>
<th>C</th>
<th>B</th>
<th>A</th>
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</table>

11. What is lowest academic grade in this course that you would find satisfying?

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>D</th>
<th>C</th>
<th>B</th>
<th>A</th>
</tr>
</thead>
</table>

12. What grade are you actually trying for in this class?

<table>
<thead>
<tr>
<th></th>
<th>F</th>
<th>D</th>
<th>C</th>
<th>B</th>
<th>A</th>
</tr>
</thead>
</table>
Please choose an option for each question. These questions refer to your grade goal for the upcoming exam.

9. What grade are you really aiming for on the upcoming exam?
   F                                D                                       C                          B                                       A

10. What grade do you expect to get on the upcoming exam?
    F                                D                                      C                          B                                       A

11. What is lowest academic grade on the upcoming exam that you would find satisfying?
    F                                D                                     C                          B                                       A

12. What grade are you actually trying for on the upcoming exam?
    F                                D                                    C                          B                                       A
Self-Efficacy

7. Please anticipate the letter grade you would receive if you took the test right now.

F      D      C      B      A

8. We are interested in how confident you are that you can get at LEAST a specific grade. First you will be asked if you can get at LEAST a certain letter grade. For example, “Can you get at LEAST a D on the upcoming examine. Then you will be asked how confident you are that you could get at LEAST a D.
If you took the test right now, could you get at LEAST a D on the upcoming exam?
Yes  No

On a scale from 0-100% how confident are you that you can get at LEAST a D if you took the test right now?

If you took the test right now, could you get at LEAST a C on the upcoming exam?
Yes  No

On a scale from 0-100% how confident are you that you can get at LEAST a C if you took the test right now?

If you took the test right now, could you get at LEAST a B on the upcoming exam?
Yes  No

On a scale from 0-100% how confident are you that you can get at LEAST a B if you took the test right now?

If you took the test right now, could you get at an A on the upcoming exam?
Yes  No

On a scale from 0-100% how confident are you that you can get at an A if you took the test right now?

9. How long do you plan to study for the upcoming exam? Please circle the amount of time that comes closes to the amount of time you plan to study for the exam.

About 30min  1 hour  1 ½ hours  2 hours  2 ½ hours  3 hours  3 ½ hours  4 hours  4 ½ hours Longer than 4 ½ hours