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Effects of Visualization on Academic Performance

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Effects of Visualization on Academic Performance

A thesis submitted in partial fulfillment
Of the requirements for the degree of
Master of Science

By

Brian Michael

B.S., Texas A&M University, 2009

2012

Wright State University

EFFECTS OF VISUALIZATION

WRIGHT STATE UNIVERSITY

SCHOOL OF GRADUATE STUDIES

JULY 10, 2012

I HEREBY RECOMMEND THAT THE THESIS PREPARED UNDER MY SUPERVISION BY Brian Michael ENTITLED Effects of Visualization on Academic Performance

BE ACCEPTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF Master of Science.

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ABSTRACT

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The purpose of my study was to investigate the possible utility of visualization, an intervention that has proven useful in both sports and clinical psychology, in an academic setting. However, knowing that there are other powerful performance oriented interventions, such as goal setting and planning, visualization would have to account for unique variance above these to be of value. Specifically, visualization was proposed to help college level students improve exam scores and account for unique variance above that accounted for by goal setting and planning in an intro level psychology course. It was concurrently hypothesized that this relationship would be mediated by the student's school specific self-efficacy and test anxiety. Participants ($N = 204$) from a Midwestern university were randomly assigned to one of four experimental conditions in which they were induced to do nothing (control group), utilize goal setting alone, utilize goal setting and planning, or utilize goal setting, planning, and visualization. I conducted a series of ANOVAs which revealed there was no significant effect on exam scores for any experimental group above that of the control. As such, a test of mediation was not possible. Alternative exploratory analyses were also conducted. Conclusions about the effectiveness of the methods implemented in this study, the effectiveness of visualization in the academic domain, and other implications for non-significant findings are discussed.

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Effects of Visualization on Academic Performance

Testing has been the primary method of measuring academic success and knowledge acquisition in the United States public education system. Academic performance in high school determines the options that are available to someone after graduation. Low scores on standardized tests can result in children being held back a year by schools or prevent access to universities they wish to attend should they desire to continue their education. Academic performance in college can influence the quality and quantity of jobs that are available for a student post-graduation and influence the level of pay and benefits as well. Given the level of importance that is placed on academic performance in our society and the consequences related to this performance, it is no wonder that there is a strong emphasis from politicians and citizens alike to help students of all levels perform at the best of their abilities. So how is it that we can aid students to perform better?

Research has identified several factors that influence academic performance. The most important individual factor in academic performance is general cognitive ability (Neisser et al., 1996). Self-efficacy is defined as a person's belief about his/her capability to produce desired effects (Bandura, 1986). Self-efficacy for education is a factor in academic performance and is inversely related to test anxiety, which can have a negative effect on performance (Rouxel, 1999). Also, research has shown that goal setting beneficially affects performance on a multitude of tasks in a variety of settings (e.g., Locke & Henne, 1986). When someone sets specific and difficult, but attainable, goals, that person will likely see improvement in performance over just 'doing their best'. Planning also aids performance because the person determines clear cut steps regarding how to attain some desired end (Smith, Locke, & Barry, 1990).

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A strategy that might benefit academic performance is visualization. Visualization is commonly used in sports psychology and the athletic domain in general is visualization. To help increase performance, an athlete will “create a movie” in his/her mind about the task that he/she is to perform, such as shooting a free throw or running a play in football. One athlete famous for doing this is the greatest golfer of all time, Jack Nicklaus.

Before every shot I go to the movies inside my head. Here is what I see. First, I see the ball where I want it to finish, nice and white and sitting up high on the bright green grass. Then, I see the ball going there; its path and trajectory and even its behavior on landing. The next scene shows me making the kind of swing that will turn the previous image into reality. These home movies are a key to my concentration and to my positive approach to every shot (Nicklaus, 1976, p.45)

Visualization is also an effective strategy used in clinical psychology to deal with anxiety. In this context, the patient is asked by his/her health care provider to think about whatever situation or object causes him/her to be anxious or panic in the hopes of slowly building an immunity to that stimulus (Joseph & Gray, 2008).

There is limited research on the effects of the use of visualization outside of these two domains. Little research has examined whether visualization can be an effective tool to aid in academic performance as it does in athletic performance. The research that does exist has suggested that it can help college students improve their performance in classes (Taylor, Pham, Rivkin, & Armor, 1998). This research has shown also that anxiety has a mediating effect but suggests that there is no significant mediating effect for self-efficacy. Also, the current research has not investigated whether these effects are influenced by goal setting or planning techniques. The aim of the current study will be to replicate the effects of visualization on academic

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performance, determine what variables may mediate this effect, and examine whether visualization accounts for incremental variance in academic performance above that accounted for by goal setting and planning. To do this, I will first discuss why academic performance is a domain that is important and should demand our attention. Then I will discuss visualization, which is a method that could positively influence academic performance. Following that I will discuss anxiety, self-efficacy, goal setting, and planning, which are other factors that can influence performance.

Importance of Academic Performance

It is no secret that there is a large emphasis placed on the importance of education in the United States. Over the course of the last century, the average education level for an American has risen dramatically. The number of Americans who are 25 or older and have at least a high school education has risen from nearly 30% in 1947 to nearly 85% in 2003 (U.S. Census Bureau, 2004). The number of Americans who have a bachelor's degree or more has risen from around 5% to 28% in that same time period. The percentage of individuals enrolled in college has risen as well. From 1973 to 2008 the number of people 18-24 enrolled in college rose from 24% to nearly 40% (U.S. Census Bureau, 2009).

This drive to become more educated can be linked largely to the fact that higher education tends to lead to higher levels of pay over the course of a person's life. A full-time worker who has a high school diploma will make around \$32,000 annually on average (U.S. Census Bureau, 2009). A full-time worker with a bachelor's degree will make around \$56,000 annually on average. This adds up to people with bachelor's degrees making nearly one million dollars more over the course of the average life expectancy than people with just a high school diploma (U.S. Census Bureau, 2003). The pay for those with a masters degree, doctoral degree,

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or professional degree (i.e., M.D., J.D.) is even higher. Now that I have shown how the level of education can have very important effects on a person's standard of living, I will discuss visualization, a method that has been used to improve performance in multiple domains and could be a possible means of improving academic performance as well.

Visualization

A construct prevalent in the field of sports psychology that is commonly used as a means to increase task performance on a physical task is visualization. Visualization, also commonly known as mental imagery or mental simulation, is defined as a "mental intervention or recreation of an experience that in at least some respects resembles the experience of actually perceiving an object or an event, either in conjunction with, or in the absence of, direct sensory stimulation" (Finke, 1980). Visualization is something that people do when they are asked to think about some future event. These depictions of the future are derived from representations of the some person or thing in the past and include representations of the self in the future. A visualized self is different from the present self but connected to it simultaneously (Fletcher, 2000). Bandura (1986) believed that visualization could help imagining one's own actions through elaborated possible selves achieving desired goals and in doing so direct the translation of goals from intentions to actions. The main focus of visualization is to visualize the positive so that you can strive for it and also the negative so that you will be better prepared to handle that scenario and avoid or manage it.

The keys to successful employment of visualization are to create the most vivid images possible that involve as many senses as possible and to practice at it systematically (Gallucci, 2008). One such instance of this systematic practice comes from a study of professional golfers. Crews and Boutcher (1986) investigated the pre-shot routines of female golfers on the LPGA

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tour and the effects on performance outcomes. They found that golfers with more consistent and longer pre-shot routines outperformed their peers. This is relevant because it illustrates the effect of consistent mental rehearsal on performance outcomes and shows that the mental preparation had an influence in the performance outcome of the players in addition to normal physical practice. This outcome has been confirmed by meta-analyses that also have found mental rehearsal to have a positive and significant effect on performance (Driskell, Copper, & Moran, 1994; Feltz & Landers, 1983).

Another field that employs visualization is clinical psychology. It is used in some cases as a means of therapy for clinical conditions such as post traumatic stress disorder (PTSD), obsessive compulsive disorder (OCD), or other simple phobias (Huppert & Roth, 2003). In this context the patient might be recommended by their psychologist to undergo exposure therapy, which is a technique that is used to expose the patient to a feared object or situation without any risk while being comforted to reduce anxiety (Joseph & Gray, 2008). In this treatment, the patient will first start with imagined exposure to the event, meaning the patient is asked to mentally place themselves in the anxiety producing situation past the level of general comfort but not to such an extent as to create undue anxiety or panic. This repeated exposure then will reduce the level of anxiety produced by the object or situation if successful. Also, there is data to suggest that simply visualizing a traumatic experience, the circumstances around that experience, and how it made you feel can have a beneficial effect on one's psychological well-being opposed to imaging that you have resolved the issue or doing nothing at all (Rivkin & Taylor, 1996).

However, there is very limited research on the use of visualization in an academic setting. Pham and Taylor (1999) attempted to discern if there was an effect of visualization on exam performance for college students and if there was a difference between outcome-based mental

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simulation vs. process-based mental simulation on performance. Outcome-based simulation, something that is popular in self-help literature, involves envisioning the outcome so that this will increase the individual's motivation and make the person more likely to achieve the goal. Process-based simulation involves envisioning all the steps that one would take to accomplish some task or goal. This method is supposed to increase the use and effectiveness of planning which in turn should lead to a higher likelihood of successfully attaining their goal.

Pham and Taylor's (1999) results showed that process-based mental simulation did in fact lead to improved exam performance compared to the class mean by an average of 6 points in their introductory psychology course. In contrast, the outcome-based mental simulation group performed worse than the class mean by an average of 2 points. This result was likely due to a detrimental increase in self-efficacy that led to less time spent preparing for the exam. Another interesting finding of the study was that participants in the process-based simulation group were not prone to the planning fallacy and were much more accurate and committed to their predicted amount of preparation time. The outcome-based simulation group was more affected by the planning fallacy and studied on average of 5 hours less than predicted. When the results were checked for any potential mediators of the participants' performance, only anxiety and planning were found to be significant.

In a similar study, Taylor and Pham (1998) followed the same procedure as the study just mentioned but assessed performance on an essay writing project. The findings were very similar in that the process-based mental simulation group had more well developed essays as compared to either the control group or the outcome-based simulation group. Participants in the process-based mental simulation group were also more accurate in predicting when they would start and

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finish the essay. Next, I will discuss different factors that can influence performance. The first of these is anxiety.

Test Anxiety

The benefits of having a higher education are obvious for reasons stated previously. The issue for many students is not the desire for education but the process of getting educated. The major issue for some students is test day. The pressure of testing situations, especially during final exams or standardized tests, can be an understandably tense time for students. These test situations are overwhelming for some students. Having to take a test causes some students to experience very high levels of anxiety. They become so anxious that they forget information they otherwise could recall, and their test performance suffers.

Discussion of anxiety dates all the way back to Biblical times and was called *pachadh* which means the symptoms of abnormal fearfulness differentiated from the reverential ‘fear of the Lord’ of a true believer (Hastings, 1909, p. 261). It was not until the 18th century that anxiety began to be “medicalized” into a kind of disease (e.g., hyperventilation became a disease of the lungs). Closely related, a French medical book even dedicated an entire chapter to fear as a medical problem in 1844 (Berrios, 1999). The second half of the 19th century saw the beginnings of anxiety being considered a psychological phenomenon labeled neurosis by Sigmund Freud. Although Freud and his counterpart Carl Jung are commonly associated with the term neurosis, credit for originally coining the term neurosis belongs to a Scottish doctor by the name of William Cullen in 1769 who defined it as “disorders of sense and motion” caused by “general affection of the nervous system” (Berrios, 1999). Physicians considered neuroses to be milder disorders compared to psychoses, which generally meant someone was suffering from a severe psychological disorder and commonly had breaks from reality (Getzfeld, 2006). The term

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neurosis is no longer used as a diagnosis and is now generally referred to as an anxiety disorder. Since the early 20th century, clinical psychologists have deemed anxiety to be a factor in a number of clinical diagnoses ranging from agoraphobia to vertigo by clinical psychologists (Berrios, 1999).

Currently, anxiety is defined as apprehension over an anticipated problem (Kring, Davidson, Neale, & Johnson, 2007). This is differentiated from general fear in that anxiety is experienced over a foreseen and potential problem, and fear is a reaction to an immediate and present problem. Researchers have considered the relationship of anxiety to performance to be that of an inverse U shape, meaning that milder anxiety will increase performance but more severe anxiety will cause decreases in performance (Kring et al., 2007).

More specifically, test anxiety is defined as “a situation-specific trait that involves anxious states and worry cognitions which are associated with test taking” (Jones & Petruzzi, 1995). Test anxiety itself is not listed in the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition, Text Revision, as a specific anxiety disorder but instead is generally associated with social phobia because of the suggested fear of being judged and evaluated by our peers and others (McDonald, 2001; Putwain, 2008).

Most who have done research on test anxiety are in agreement that there are two components to test anxiety, a worry or cognitive component and an emotional or autonomic arousal component (Jones & Petruzzi, 1995). The cognitive component consists of negative thoughts that are unassociated with the test itself typically paired with some type of emotional distress (i.e., “All my friends are going to do better than me”, McDonald, 2001). The autonomic arousal component is a more physical reaction to the situation such as tension, elevated heart

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rate, perspiration, shaking, sickness, and/or dry mouth, all of which can shift a student's focus away from the task.

Further, people of different demographic categories react differently to test anxiety. Studies have shown that anxiety is more prevalent for females compared to males, blacks compared to whites, and later born children compared to first born (Hembree, 1988; Jones & Petruzzi, 1995). These same studies have indicated that test anxiety starts to affect students around the 3rd grade level for both classroom tests and standardized tests (Jones & Petruzzi, 1995). This is especially important to be cognizant of given because of the 'No Child Left Behind' Act that was enacted in 2001 which resulted in the increased use of standardized testing in schools. Before and during these standardized tests, some children show greater signs of stress and anxiety than would be considered normal (Putwain, 2008). These children are very likely to be worried that they will fail to perform as well as their peers or that a poor score will affect them in the future. Now that I have addressed test anxiety, I will address another factor that can influence performance, self-efficacy.

Self-Efficacy

Developed as a part of social cognitive theory by Alfred Bandura, self-efficacy is defined as "a person's belief about his/her capability to produce desired effects" (Bandura, 1986). This means that compared to students who doubt their abilities and knowledge, those with high self-efficacy for testing, in general or in a specific subject, will achieve at a higher score (Schunk, 1995). Research on academic self-efficacy has revealed a significant effect on performance. Multon, Brown, and Lent (1991) suggested that self-efficacy accounts for approximately 14% of the variance in students' academic performance, with stronger effect sizes for high school and college students compared to younger students.

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Meta-analyses have shown a relationship between self-efficacy and performance (Multon, Brown, & Lent, 1991; Stajkovic & Luthans, 1998). This relationship holds true in many domains. In the workplace, meta-analysis has shown that there is a large correlation between self-efficacy and performance, $r = .38$ (Stajkovic & Luthans, 1998). This correlation suggests that self-efficacy could be a better predictor of performance than other commonly accepted individual differences in job performance such as personality traits. Looking at self-efficacy in academic settings, the result is the same. Self-efficacy shows direct and indirect effects on academic performance at the college level (Multon, Brown, & Lent, 1991). Stronger beliefs in one's own efficacy for education also leads to better student adjustment to college level material and higher commitment to stay in school after the first year (Chemers, Hu, & Garcia, 2001). Next I will discuss goal setting, which is a means for improving performance that many consider to be the most robust effect in psychology (Locke & Latham, 1990).

Goal setting

A psychological framework for increasing performance on a task is goal setting. Developed by Edwin Locke in the mid-1960s, the basic premise for goal setting is that specific and difficult, yet attainable, goals will lead to an increase in productivity over being told to 'do your best' (Locke & Latham, 1990). A review of field and lab studies that implemented goal setting showed that 90% of the reviewed studies showed an increase in performance (Locke et al., 1981).

Certain variables can potentially influence the effectiveness of goal setting. Two of these variables are the difficulty of the goal and whether the goal is self-assigned or assigned by an outside source. Goal setting theory dictates that more difficult goals will lead to an increase in performance (Latham, Steele, & Saari, 1982; Locke & Latham, 1990, p. 27). Also, researchers

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have found that a goal that is set by the individual and not assigned by a supervisor or other person leads to higher levels of goal commitment which in turn leads to increases in performance (Locke and Latham, 1990). A third variable that has been shown to influence the effects of goal setting is the complexity of the task. In a meta-analytic review, researchers found that goal setting effects were stronger for easier as compared to more complex tasks (Wood, Mento, & Locke, 1987).

Two other variables that can moderate effects for goal setting are goal commitment and feedback. Regardless of whether the goal is specific and challenging for an individual, if the person does not “buy into” that goal and want to achieve it, the goal will be meaningless and there will be no subsequent increase in performance (Locke et al., 1981). Feedback also is crucial for individuals implementing goal setting. Feedback is a necessary component for the individual to be able to track their progress on a task. This progress is essential so that the individual can stay motivated to achieve the goal (Locke et al., 1981).

Planning

Lastly, I will discuss planning. Planning, although not required to be used in conjunction with goal setting, can facilitate the achievement of goals by laying out the steps to achieve that goal. Planning is defined as the predetermination of a course of action aimed at achieving some goal (Hayes-Roth & Hayes-Roth, 1972). The formulation of planning is influenced by past experience, executed in real present time, and is usually directed toward a future goal (Benson, 1997). Planning can be of particular use when an individual is faced with a difficult goal or a learning goal, especially with complex tasks (Locke, Durham, Poon, & Weldon, 1997). As discussed before, task complexity can have a moderating effect on goal setting. Good planning is critical for these complex tasks and as such plays an important role in the performance

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outcome. In cases where the task is complex, a specific task strategy could be required and a more universal plan (e.g., put forth effort, be persistent, direct focus) could be ineffective (Locke et al., 1997). A hindrance in most people's planning abilities is that people overestimate their abilities or underestimate the amount of time that it will take for a task to be either started or completed. This general failure of effectively understanding our own capabilities has been coined "the planning fallacy" (Kahneman & Tversky, 1979).

Proposed Research

As discussed above, goal setting is a very effective method for improving performance, as is planning. Because these two methods account for a large portion of variance in performance, to be of value, any alternative intervention would have to account for variance that goal setting and planning did not account for already. I propose that visualization accounts for variance that goal setting and planning do not. Visualization has shown in previous research to have a positive effect on performance. If properly used, visualization can reflect conscious and intentional consideration of a task as well as enable the encoding and recall of verbal information. These processes are likely similar to processes underpinning goal setting and planning. However, visualization can evoke emotion from whoever uses it (Gallucci, 2008). Also, visualization enables the encoding and recall of information that is nonverbal. Thus, visualization might reflect processes similar to goal setting and planning as well as additional processes reflecting emotion and nonverbal information. For these reasons, I make the following hypotheses:

Hypothesis 1: Visualization will account for unique variance in academic test performance above goal setting.

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Hypothesis 2: Visualization will account for unique variance in academic test performance above goal setting and planning.

Anxiety has been shown to have an inverted U-shaped relationship with performance. Small amounts of anxiety can aid performance and large amounts can be detrimental to performance. This detriment can come in the form of worry cognitions or autonomic arousal. Worry cognitions are negative thoughts about performance irrelevant to the task which can distract attention from the task and create a kind of self-fulfilling prophecy, negatively impacting performance. Autonomic arousal is a physical reaction, such as increased heart rate, sweating, or heavy breathing, to a perceived stressful stimulus. This arousal can distract a person's attention from the task and lead to a detriment in performance. Due to the apprehensive nature of taking exams at the college level, I assumed for this study that I observed the downside of the anxiety-performance curve where people are experiencing moderate to high levels of anxiety and as such I expected anxiety to have a linear negative relationship with performance. As I discussed before, visualization has been utilized in a clinical context for patients suffering from ailments such as post-traumatic stress disorder or obsessive compulsive disorder, and researchers (Rivkin & Taylor, 1999) have shown visualization to be effective in reducing levels of stress and anxiety reported. For these reasons, I make the following hypothesis:

Hypothesis 3: Test anxiety will mediate visualization effects on academic performance.

Meta-analyses have shown that self-efficacy has a positive influence on performance. People with higher self-efficacy perform better than people with low self-efficacy. Specifically, students in high school and college with higher school specific self-efficacy perform better than students with lower self-efficacy (Chemers, Hu, & Garcia, 2001). Higher self-efficacy also can lead to higher commitment and persistence in college students (Chemers, Hu, & Garcia, 2001).

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Visualization should reinforce positive self-images and decrease sensitization to the target experience, i.e., reduce anxiety (Fletcher, 2000). For those reasons, I make the following hypothesis:

Hypothesis 4: Self-efficacy will mediate visualization effects on academic performance.

Method

Participants and Design

I used undergraduate students who were enrolled in a large, public, Midwestern university. The students participated as part of a research requirement for an introductory psychology course. Participants were randomly assigned to one of four conditions: a control condition, a goal setting only condition, a goal setting and planning condition, or a goal setting, planning and visualization condition. Condition was a between subject factor. Participants completed three tests, the only within subject factor.

Psychology Course

The Introduction to Psychology course was designed so that almost the entire course is online. The students had both a lecture portion and a lab portion of the course. The lecture portion of the course was traditional in that students show up to a large lecture room to receive instruction on material from the primary course instructor on different topics in psychology. During the course of the quarter, the students took four online exams and one traditional final exam taken using a paper and pencil format. A unique feature of the course was the way the exams are set up. The approach taken in this course was one of mastery. Students were given a one week time period in which to complete each online exam, and they were allowed five attempts at each exam. The lab portion of the course was meant to be a more applied setting for

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the course with demonstrations of psychological principles and group discussions. Because the lab portion of the course is not relevant to my study, I will not discuss it further.

Manipulation

There were four levels of the manipulation, resulting in a control group, goal setting only group, goal setting plus planning group, and goal setting plus planning plus visualization group.

Control Group. Participants assigned to the control group received no goal setting, planning, or visualization induction.

Goal setting (GS) Only Group. Participants in the goal setting only (GS) group received only the goal setting induction. I asked each participant in the goal setting only group to set a goal for each of his or her exam scores and for his or her final grade in the introductory psychology course on a 0-100 scale and not on an 'A thru F' scale. I asked each participant to set a goal after each test for the next test and for his/her final grade. The instructions for the goal setting induction are shown in Appendix A.

Goal choice and commitment forms. I obtained participants' goals using a two-item measure (see Appendix B). I measured goal commitment (see Appendix C) using a 4-item measure developed by Hollenbeck, Klein, O'Leary and Wright (1989). Participants responded on a 5-point scale with '1' indicating "Strongly disagree" and '5' indicating "Strongly agree." An example item is "It's hard to take this goal seriously." Item responses were reverse scored and summed. Higher scores indicated higher goal commitment. The internal consistency of the measure was .71 (Hollenbeck et al., 1989).

Goal setting plus Planning (GS+P) Group. Participants in the goal setting plus planning(GS+P) group received both the goal setting and planning inductions. I asked each participant in the goal setting plus planning group to set goals using the same induction as in the

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goal setting only condition. In addition, participants in the goal setting plus planning group implemented planning. Specifically, I asked each participant to create a plan for attaining each of his/her chosen goals. I asked each participant to report the amount of time per week that s/he planned to spend reading course material and how much time s/he planned to spend studying prior to each test. Also, I asked participants to select a number of behaviors from a provided list or come up with their own behaviors that they would employ to meet their goals. The instructions for the goal setting plus planning induction are shown in Appendix D.

Planning form. I measured planning using a 16-item measure developed for the current study (see Appendix E). The first two items asked participants to report how much time they planned to spend reading the material and studying for the next exam. The remaining 14 items indicated behaviors participants might use in preparing for the next exam. Participants responded with either a Yes or No to each behavior indicated.

Goal setting plus Planning plus Visualization (GS+P+V) Group. Finally, participants in the goal setting plus planning plus visualization (GS+P+V) group received the goal setting, planning, and visualization inductions. I asked each participant in the goal setting plus planning plus visualization group to set goals and create plans using the same inductions as in the goal setting plus planning condition. In addition, I asked each participant to engage in visualization. Specifically, I asked each participant to mentally picture spending the planned amount of time reading and studying and performing the planned behaviors. The instructions for the goal setting plus planning plus visualization induction are shown in Appendix F.

Mediator Measures

Test anxiety. I assessed individual levels of anxiety felt toward testing situations (see Appendix G) using a shortened 5-item version of the Test Anxiety Inventory (TAI-5), which was

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originally developed by Spielberger et al. (1980) and modified by Taylor and Deane (2002). The TAI-5 measures how frequently a respondent experiences symptoms of anxiety prior to, during, and after examinations. The original measure was 20 items in length with items measuring both worry and emotional components of test anxiety. The 5-item measure also assessed both worry and emotion. Participants rated how much they agreed or disagreed with each statement on a 4-point scale with a response of '1' indicating "Strongly disagree" and '4' indicating "Strongly Agree". An example item is "During tests I feel very tense". Item scores were summed and multiplied by 4. Higher scores indicated higher test anxiety. The correlation obtained for scores on this TAI-5 with scores on the original 20 item version was $r = .94$ (Taylor & Deane, 2002). Reported reliability coefficients are .93 for the 20 item version and .87 for the TAI-5 (Taylor & Deane, 2002).

Self-efficacy. I measured participants' self-efficacy (see Appendix H) using a slightly modified version of the 10-item Personal Efficacy Beliefs Scale developed by Riggs et al. (1994). I modified item wording so that the items reflected academic efficacy rather than work efficacy. Participants responded on a 5-point scale with a response of '1' indicating "Strongly disagree" and a response of '5' indicating "Strongly agree". An example item is "I have all the skills needed to perform very well in my courses". Responses were averaged across all items, and higher averages indicated higher levels of general self-efficacy. The internal consistency reliability of the personal efficacy scale was .86 (Riggs et al., 1994).

Outcome Measure

Academic performance. I used participants' exam scores and final exam scores as the measure of academic performance. Participants received a score between 0 and 100 on each exam and the final, reflecting the percentage of correct responses. I obtained these scores from

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the course instructor. I obtained scores for each exam and each retake of an exam. I used only the score from the first administration of each exam in my analyses. I obtained scores from exams that were taken a second, third, fourth, and fifth time only for use in exploratory analyses.

Measures Included to Enable Examination of Alternative Explanations

Social Desirability Responding. I measured participants' potential levels of social desirability (see Appendix I) responding using the Balanced Inventory of Desirable Responding (BIDR; Paulhus, 1991). The BIDR consists of two 20 item subscales that are designed to measure the level at which a person attempts to use impression management, which refers to the tendency of the survey taker to distort his/her responses to cast him/herself in a positive light, and self-deception enhancement, which refers to the tendency of the survey taker to think of him/herself in a positive manner (Barrick & Mount, 1996; Li & Bagger, 2007). The participant indicated how much they agree with each item on a 7-point scale, with a response of '1' meaning "Not true" and a response of '7' meaning "Very true". An example of an impression management scale item is "I have some pretty awful habits" and an example of a self-deception enhancement item is "I have not always been honest with myself." After inverting the reverse scored items, one point was awarded for each response of a '6' or '7', meaning possible scores on each subscale ranged from 0 to 20. Higher scores indicated greater social desirability responding. The internal consistencies of the impression management and self-deception enhancement subscales were .74 and .68, respectively (Paulhus, 1991). I included this measure to enable examination of alternative explanations for results.

Personality. I measured the Big Five personality factors (see Appendix J) using 50 items from the International Personality Item Pool (IPIP; <http://ipip.ori.org/>). I measured Openness to Experience, Conscientiousness, Extraversion, Agreeableness, and Neuroticism with 10-item

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subscales. Participants responded on a 5-point scale with a response of '1' indicating "Very Inaccurate" and a '5' indicating "Very Accurate". Responses were averaged across items for each trait. Higher averages indicated higher levels of that specific trait. The internal consistencies for the Big-5 traits of Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience ranged from .86-.91, .77-.85, .81-.90, .86-.91, and .82-.89, respectively (<http://ipip.ori.org/>). I included this measure to enable examination of alternative explanations for results.

Affectivity. I measured participants' levels of affectivity (see Appendix K) with the Positive and Negative Affect Schedule (PANAS; Bateman & Crant, 1993). The PANAS consists of two 10-item mood scales that measure an individual's level of positive and negative affectivity at different time periods (e.g., this moment, today, the past few days, the past few weeks, the past year, in general). Positive affect is defined as the extent to which a person feels enthusiastic, active, and alert. Negative affect is defined as a general dimension of subjective distress and unpleasurable engagement that subsumes a variety of aversive mood states, including anger, contempt, disgust, guilt, and fear. Participants were shown a list of generally positive and negative words, such as "distressed" or "excited", and indicated how much that word describes the way they have felt for a defined period of time. Time frames range from the current moment to the past year. Because I intended to examine the effects of dispositional affectivity, I asked participants to report the extent to which they "generally feel this way".. Participants responded on a 5-point scale with '1' meaning "Very slightly or not at all" and '5' meaning "Extremely or a lot". The scores for positive and negative words were then totaled. Higher scores indicated higher positive and negative affectivity. The internal consistencies of the PANAS ranged from .86-.90 for the positive affect scale and .84-.87 for the negative affect

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scale (Watson, Clark, & Tellegen, 1988). I included this measure to enable examination of alternative explanations for results.

Trait Anxiety. I assessed trait anxiety (see Appendix L) using the State-Trait Anxiety Inventory (STAI) developed by Spielberger (1983). The STAI uses two subscales to measure 1) stable individual differences in proneness to experience anxiety (trait anxiety) and 2) proneness to have an anxious response to situations (state anxiety). When both scales are administered, one should administer the State-Anxiety scale before the Trait-Anxiety scale due to potential influence on responding if given in reverse order (Spielberger, 1983). Each subscale has 20 items. Participants rate the intensity of their feelings on the State-Anxiety scale on a 4-point scale with a response of '1' indicating "Not at all" and a response of '4' indicating "Very much so". An example item on this subscale is "I feel tense". On the Trait-Anxiety scale, participants rated the frequency of their feelings of trait-anxiety on a 4-point scale with a response of '1' indicating "Almost never" and a response of '4' indicating "Almost always". An example item on this subscale is "I feel nervous and restless". Internal consistency reliability coefficients for the state-anxiety and trait-anxiety subscales ranged from .91-.93 and .90-.91 for college students, respectively (Spielberger, 1983). Because I intended to examine the effects of dispositional anxiety, I administered only the trait anxiety subscale. Item scores were summed on the subscale. Higher scores indicated that the respondent was higher in trait anxiety. I included this measure to enable examination of alternative explanations for results.

Proactive Personality/Personal Initiative. I assessed proactive personality (see Appendix M) using the 17-item Proactive Behavior measure created by Bateman and Crant (1993). The Proactive Behavior measure assesses the extent to which an individual attempts to interact with and influence his/her environment. An example of an item on the measure is "I am

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constantly on the lookout for new ways to improve my life”. Participants responded using a 7-point scale with a response of ‘1’ indicating “Strongly disagree” and a response of ‘7’ indicating “Strongly agree.” Item scores were averaged with higher scores indicating a more proactive personality. The Proactive Behavior measure has an internal consistency reliability of .89 (Bateman & Crant, 1993).

Similar to proactive personality, I also measured participants’ personal initiative (see Appendix N) with a measure created by Frese, Fay, Hilburger, Leng, and Tag (1997). Personal initiative is described as the extent to which an individual takes an active and self-starting approach to work and going beyond what is formally required in a given job. An example item on the personal initiative measure is “Whenever something goes wrong, I search for a solution immediately”. Participants responded using a 5-point scale with a response of ‘1’ indicating “Strongly disagree” and a response of ‘5’ indicating “Strongly agree”. Odd numbered items on this measure assessed self-reported initiative and even numbered items assessed passivity. Scores for odd and even numbered items were averaged to produce the two scores with higher scores indicating higher initiative or higher passivity. The Personal Initiative measure has an internal consistency reliability of .87 for the passivity subscale and .84 for self-reported initiative (Frese, Fay, Hilburger, Leng, & Tag, 1997). I included these measures to enable examination of alternative explanations for results.

Social Support. I measured participants’ perceived social support from family (PSS-A; see Appendix O) with a measure developed by Procidano and Heller (1983). The perceived social support from family subscale contains 20 items to which respondents answer “Yes”, “No”, or “I don’t know”. Each response indicating social support (i.e., Yes) was scored as +1; “No” and “I don’t know” responses were scored as 0. As such, overall scores on each scale ranged

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from 0, indicating no perceived social support, to 20, indicating maximal perceived social support from family. The internal consistency of the perceived social support from family subscale is .90 (Procidano & Heller, 1983). I included this measure to enable examination of alternative explanations for results.

Demographics. I asked each participant to report his/her age, race, gender, class ranking, major, college and high school GPA, and ACT/SAT scores (see Appendix P).

Effort and Compliance. Because of concerns of possible deficiencies in effort on the part of participants, a measure was created for the purposes of this study to assess compliance with the instructions for each of the three experimental conditions. The measures all asked participants to answer truthfully and informed them that their responses would not affect their status in the study or alter the credit awarded. The first measure was given to the GS only group and consisted of three items asking the participants if they honestly tried to reach the goals they set for themselves, if they changed their goals after first setting a goal but before an exam, and if so, on how many exams they did this (see Appendix Q). The second measure was given to the GS+P group. It consisted of the three items on the measure given to the GS only group but added four additional items asking the participants if they honestly followed their plans, how many days a week they followed their plan, if they ever changed their plan, and if so on how many exams did they change their plan prior to taking the exam (see Appendix R). The third measure was given to the GS+P+V group. It consisted of all the items on the measures given to the GS and the GS+P groups but had an additional two items asking the participant to report if they utilized visualization in preparation for the exam and how many days a week they followed the instruction to visualize for 5 minutes (see Appendix S). Higher scores indicated higher levels of compliance with the manipulations.

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Procedure

The participants first completed an informed consent process (see Appendix T) and chose to agree or disagree to a waiver. The waiver provided the experimenter with permission to access university records to obtain participants' high school and college GPA and standardized test scores (See Appendix U). Then, participants completed an online survey. In the online survey, participants completed the measure of social desirability responding first. Next, participants completed the measure of Big-5 personality traits. Then, participants completed the positive-affectivity/negative-affectivity scale, the trait-anxiety portion of the State-Trait Anxiety Inventory, a proactive personality measure, the personal initiative measure, and a perceived social support measure. Finally, participants completed a measure of demographic information.

Upon completion of the online survey, I assigned participants randomly into one of the four experimental conditions, and participants received the instructions appropriate to their condition and completed the appropriate forms. All participants completed measures of test anxiety and self-efficacy for the first exam before exiting the online survey website. At the end of the week during which participants could take and retake the first exam, I sent an e-mail to participants in all four groups, instructing them to go to one of four websites. On their assigned website, participants again received the instructions and complete the forms appropriate to their assigned experimental condition. Participants then completed the text anxiety and self-efficacy measures for the second exam. At the end of the week during which participants could take and retake the second exam, I sent a second e-mail to participants and repeated the cycle described above in preparation for the third exam. I sent a third e-mail at the end of the third exam time period, repeating the cycle described above in preparation for the fourth exam. Finally, I repeated the cycle described above in preparation for the final exam. At the end of this last set of

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surveys, participants filled out a compliance measure to assess how much effort they put forth as a participant in the study. After participants completed the final exam, I sent one final e-mail, thanking them for their participation and debriefing them (see Appendix V).

Results

Descriptive Statistics

The study included 357 participants, of which 33 participants were excluded from the analyses because they did not complete the surveys required for the first induction of their experimental condition, 19 were excluded from the analyses because they did not complete the surveys required for the second induction of their condition, and 19 were excluded from the analyses because they did not complete the surveys for the third induction of their condition. Of the remaining 286 participants, 61 were removed for missing test scores or failure to complete entire surveys in a particular battery, and 2 were removed for test scores that were more than 3 standard deviations below the mean. To maintain an equal sample size in each group, an additional 19 were excluded by random selection. The final sample for the study included 204 participants, 144 female and 60 male, with an average age of 18.91 years. The demographics of participants in each experimental condition are shown in Table 1.

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Table 1.

Participant Demographic Information

Group	Age	Gender		Ethnicity		GPA	ACT
		M	F	White	Minority		
0	18.59	18	33	41	10	3.41	22.75
1	19.47	12	39	39	12	3.55	22.29
2	19.31	13	38	37	14	3.44	21.90
3	18.25	17	34	41	10	3.50	21.96

0 = Control, 1 = Goal Setting, 2 = Goal Setting and Planning, 3 = Visualization

Initial Group Differences

I used an ANOVA approach to examine whether there were any significant differences between experimental conditions in key demographic variables. Results of analyses indicated that there was a similar percentage of female participants in each of the four experimental conditions, $F(3, 200) = 1.58, p > .05$, and a similar percentage of Caucasians, $F(3, 198) = 1.68, p > .05$. There were no significance differences in GPAs reported by participants in the four experimental conditions, $F(3, 183) = 0.81, p > .05$, and no significant differences in ACT scores reported by participants in the four experimental conditions, $F(3, 166) = 0.42, p > .05$. GPA was not correlated with exam performance with correlations of .032, -.013, -.055, and .119, $p > .05$, for Exams 1 through 4, respectively. ACT scores were correlated with exam performance with correlations of .467, .476, .447, and .406, $p < .01$, for Exams 1 through 4, respectively. I also tested for any initial group differences in cognitive ability to make sure my random assignment worked by conducting an ANOVA on Exam 1 scores. The resulting ANOVA indicated there

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was no difference between groups on Exam 1 performance, $F = 0.32$, $p > .05$ (see Table 2).

Performance means for Exam 1 are shown in Table 3.

Table 2.

Effects of Random Assignment on Exam 1 Performance

Source	SS	df	MS	F	Critical F
Between Subjects	226.70	3	75.57	0.32	2.65
Within Subjects	46832.84	200	234.16		
Total	47059.53	203			

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Table 3.

Exam Performance Means and Stand Deviations by Condition

Condition	Exam 1		Exam 2		Exam 3		Exam 4		Overall	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Overall	65.39	15.23	64.76	16.01	64.34	16.01	62.50	17.85	63.84	16.61
Control	64.75	13.38	62.22	16.32	62.18	15.27	59.43	18.11	61.28	16.55
GS	65.66	18.26	65.32	16.41	65.62	16.81	64.31	16.87	65.08	16.60
GS+P	66.97	14.54	68.41	14.56	66.54	14.38	64.36	15.82	66.43	14.93
GS+P+V	64.18	14.58	63.09	16.44	63.01	17.44	61.92	20.33	62.56	17.90

Manipulation Effects on Goal Commitment and Planning Activities

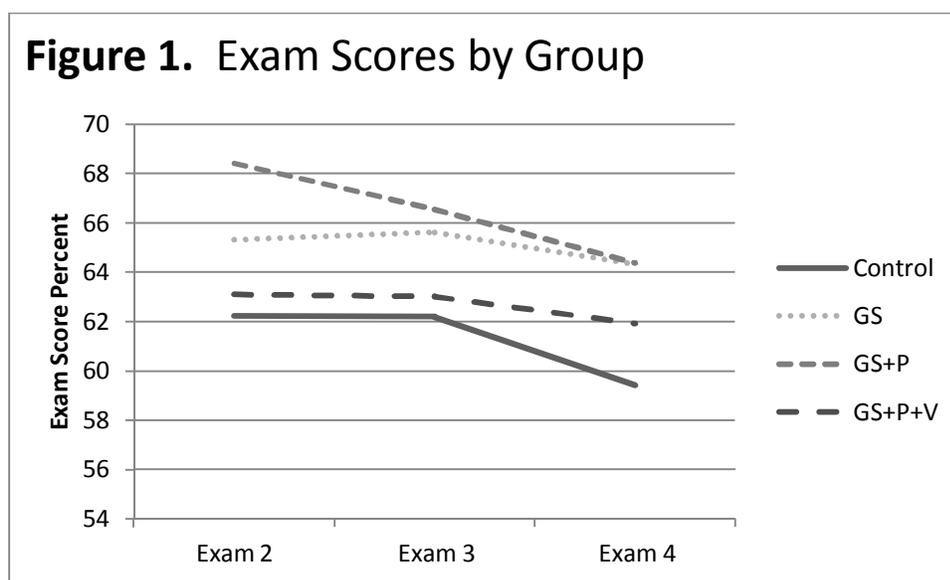
To assess whether there was a difference between the groups in reported levels of goal commitment and planning, I conducted an ANOVA between the appropriate groups. I conducted an ANOVA of the reported goal commitment in the goal setting only, the goal setting and planning, and the visualization groups to determine whether there was a significant difference between the 3 groups. The result was significant, $F(2, 150) = 3.13, p < .05$. My results revealed a mean goal commitment score of 16.34 ($SD = 2.82$) out of a possible maximum score of 20, reflecting moderate to high goal commitment across the three groups. However, results of follow-up t-tests for each exam indicated that the GS+P group ($M = 16.95, SD = 2.97$) was more committed than the GS group ($M = 16.24, SD = 2.53$), $t = 2.90, p < .01$, and more committed than the GS+P+V group ($M = 15.84, SD = 2.90$), $t = 2.70, p < .01$, on the third exam only. I concluded that participants in all goal setting conditions were at least moderately committed to their goals although some groups were more committed than others.

Then, I conducted an ANOVA to examine whether participants in the two conditions involving planning differed in the number of planning behaviors they engaged in. Specifically, I compared participants in the goal setting and planning condition and the goal setting plus planning plus visualization condition. The result was not significant, $F(1, 100) = 0.08, p > .05$. Participants in these conditions reported planning to engage in a similar number of behaviors to reach their goals. Given that participants reported a mean of 4.87 planning behaviors chosen ($SD = 5.17$), more than the minimum of 3 planning behaviors I asked students to select, I concluded that participants across planning conditions were engaging in at least a moderate level of planning.

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Effects of Goal Setting, Planning, and Visualization on Academic Performance

To test Hypotheses 1 and 2, I conducted an ANOVA to determine whether there was a significant effect of experimental condition on scores on the three exams. Exam scores are displayed in Figure 1. Also, the means and standard deviations for scores on each of the exams are shown in Table 3. The ANOVA indicated non-significant effects for experimental condition, $F(3, 200) = 1.49$, and exam, $F(2, 400) = 2.45$, both $p > .05$. These results failed to provide support for either hypothesis and suggested that using visualization does not provide students with a significant benefit to academic performance above that provided by goal setting (Hypothesis 1) or goal setting combined with planning (Hypothesis 2). ANOVA results are shown in Table 4. Note also that specific contrasts used in the analyses are reported. Contrast A1 reflects a comparison of the control group to all other experimental conditions. Contrast A2 reflects a comparison of the GS and GS+P conditions to the GS+P+V condition. Contrast A3 reflects a comparison of the GS group to the GS+P group. Contrast B1 reflects a comparison of Exam 2 and Exam 3 to Exam 4. Contrast B2 reflects a comparison of Exam 2 to Exam 3.



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Table 4.

Effects of Experimental Condition on Exam Scores

Source	SS	df	MS	F	Critical F
Between Subjects	115094.58	203			
A (Group)	2522.03	3	840.68	1.49	2.65
A1	1336.44	1	1336.44	2.37	3.89
A2	1046.10	1	1046.10	1.86	3.89
A3	139.49	1	139.49	0.25	3.89
Subjects w/ A	112572.55	200	562.86		
Within Subjects	53551.11	408			
B (Test)	645.06	2	322.53	2.45	3.00
B1	636.25	1	636.25	4.83	3.86
B2	8.81	1	8.81	0.07	3.86
AB	176.18	6	29.36	0.22	2.10
AB1	16.52	1	16.52	0.13	3.86
AB2	6.20	1	6.20	0.05	3.86
AB3	65.48	1	65.48	0.50	3.86
AB4	2.14	1	2.14	0.02	3.86
AB5	25.31	1	25.31	0.19	3.86
AB6	60.53	1	60.53	0.46	3.86
B * Subjects w/ A	52729.88	400	131.82		
Total	168645.69	611			

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To examine further potential effects of condition, I conducted contrasts between the visualization group and each other group. The contrast between the control group and the visualization group revealed a non-significant effect, $F(1, 100) = 0.19, p > .05$. The contrast between the goal setting only group and the visualization group revealed a non-significant difference between group means, $F(1, 100) = 0.80, p > .05$. The contrast between the goal setting and planning group and the visualization group indicated a non-significant effect, $F(1, 100) = 2.01, p > .05$. Because the goal setting and planning group had the largest mean and the control group had the smallest mean, I examined a contrast between these two groups to check for a significant difference. This contrast also was non-significant, $F(1, 100) = 3.92, p > .05$. Results of these analyses are shown in Tables 5 through 8.

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Table 5.

Analysis of Variance of Exam Scores Comparing Control Group and Visualization Group

Source	SS	df	MS	F	Critical F
Between Subjects	64944.80	101			
A (Group)	124.89	1	124.89	0.19	3.94
Subjects w/ A	64819.91	100	648.20		
Within Subjects	25548.32	204			
B (Test)	328.05	2	164.02	1.30	3.00
B1	326.08	1	326.08	2.59	3.89
B2	1.97	1	1.97	0.02	3.89
AB	25.56	2	12.78	0.10	3.00
AB1	22.63	1	22.63	0.18	3.89
AB2	2.93	1	2.93	0.02	3.89
B * Subjects w/ A	25194.72	200	125.97		
Total	90493.12	305			

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Table 6.

Analysis of Variance of Exam Scores Comparing GS Group and GS+P+V Group

Source	SS	df	MS	F	Critical F
Between Subjects	61240.64	101			
A (Group)	488.63	1	488.63	0.80	3.94
Subjects w/ A	60752.01	100	607.52		
Within Subjects	29842.40	204			
B (Test)	137.23	2	68.62	0.46	3.00
B1	130.23	1	130.23	0.88	3.89
B2	7.01	1	7.01	0.05	3.89
AB	3.79	2	1.89	0.01	3.00
AB1	3.57	1	3.57	0.02	3.89
AB2	0.22	1	0.22	0.00	3.89
B * Subjects w/ A	29701.38	200	148.51		
Total	91083.04	305			

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Table 7.

Analysis of Variance of Exam Scores Comparing GS+P Group and GS+P+V Group

Source	SS	df	MS	F	Critical F
Between Subjects	58336.46	101			
A (Group)	1150.27	1	1150.27	2.01	3.94
Subjects w/ A (Group)	57186.19	100	571.86		
Within Subjects	25415.69	204			
B (Test)	406.73	2	203.37	1.63	3.00
B1	380.39	1	380.39	3.06	3.89
B2	26.34	1	26.34	0.21	3.89
AB	106.49	2	53.24	0.43	3.00
AB1	38.48	1	38.48	0.31	3.89
AB2	68.01	1	68.01	0.55	3.89
B * Subjects w/ A	24902.47	200	124.51		
Total	83752.15	305			

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Table 8.

Analysis of Variance of Exam Scores Comparing Control Group and GS+P Group

Source	SS	df	MS	F	Critical F
Between Subjects	53853.74	101			
A (Group)	2033.20	1	2033.20	3.92	3.94
Subjects w/ A	51820.54	100	518.21		
Within Subjects	97498.92	204			
B (Test)	635.41	2	317.70	0.66	3.00
B1	588.57	1	588.57	1.22	3.89
B2	46.84	1	46.84	0.10	3.89
AB	44.81	2	22.40	0.05	3.00
AB1	2.09	1	2.09	0.00	3.89
AB2	42.72	1	42.72	0.09	3.89
B * Subjects w/ A	96818.70	200	484.09		
Total	151352.66	305			

In one final post hoc analysis, I compared group performance within each exam by conducting pairwise comparisons between experimental conditions. Only one comparison, the control group compared against the GS+P group on Exam 2, was significant, $t = -2.02$, $p < .05$. The results for this and all other comparisons can be seen in Table 9.

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Table 9.

Exam Score Comparisons by Group

Group comparison	Exam 1		Exam 2		Exam 3		Exam 4	
	<i>t</i>	Sig.	<i>t</i>	Sig.	<i>t</i>	Sig.	<i>t</i>	Sig.
Control v GS	-0.29	0.773	-0.96	0.342	-1.08	0.282	-1.41	0.162
Control v GS+P	-0.80	0.424	-2.02	0.046	-1.48	0.141	-1.46	0.147
Control v GS+P+V	0.20	0.839	-0.27	0.789	-0.26	0.799	-0.651	0.517
GS v GS+P	-0.40	0.690	-1.01	0.316	-0.3	0.768	-0.01	0.99
GS v GS+P+V	0.45	0.652	0.68	0.496	0.77	0.443	0.65	0.519
GS+P v GS+P+V	0.97	0.336	1.73	0.087	1.12	0.268	0.68	0.501

Mediation of Visualization Effects on Academic Performance

To test Hypotheses 3 and 4, I conducted a linear regression to determine whether test anxiety (Hypothesis 3) or self-efficacy (Hypothesis 4) mediated condition effects on test performance. Although it provided a conservative test, I used the procedure recommended by Baron and Kenny (1986) to assess potential mediation. Their procedure requires that three preliminary tests are significant in order to justify the test of mediation. The three tests examine the effects of 1) the independent variable on the outcome, 2) the mediators on the outcome, and 3) the independent variable on the mediators. The first step of the analysis was to examine the effects of experimental condition on test performance. However, the analyses reported above (Hypotheses 1 and 2) indicated no significant effect, thus precluding a test of mediation.

In consequence, I instead conducted some post hoc exploratory analyses. Specifically, I examined the relationships of each of the mediators and the outcome, and then I examined

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relationships between experimental condition and each of the mediators. First, I examined bivariate correlations between the mediators, i.e., test anxiety (TestAnx) and self-efficacy (PersEff), and the outcome, i.e., exam scores. Test anxiety (assessed prior to each exam) was significantly correlated with scores on Exam 3, $r = -.148$, $p < .05$, but not with Exam 2 or Exam 4 scores, r 's = $-.046$ and $-.079$, p 's $> .05$, respectively. Similarly, school self-efficacy (assessed prior to each exam) was significantly correlated with scores on Exam 3, $r = .196$, $p < .05$, but not with scores on Exam 2 or Exam 4, r 's = $.151$ and $.006$, p 's $> .05$, respectively (see Table 10).

Next, I examined relationships between experimental condition and the mediators. I conducted ANOVAs to assess the relationship between experimental condition and each mediator, i.e., test anxiety and self-efficacy. One ANOVA revealed a non-significant effect for experimental condition on test anxiety overall, $F(3, 200) = 1.84$, $p > .05$ (see Table 11). Contrast A2 was significant, indicating that the GS and GS+P groups differed significantly from the GS+P+V group. The GS+P+V group reported higher test anxiety, relative to the other two groups (see Table 12 and Figure 2). A second ANOVA indicated a non-significant effect for experimental condition on self-efficacy, $F(3, 200) = .46$, $p > .05$ (see Table 13). Personal Efficacy means and standard deviations can be found in Table 14.

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Table 10.

Intercorrelations Involving Performance, Anxiety, and Self-Efficacy

	Exam 1	Exam 2	Exam 3	Exam 4	TrAnx	TAnx1	TAnx2	TAnx3	PersEff1	PersEff2	PersEff3	HS GPA	ACT
Exam 1	-												
Exam 2	.509**	-											
Exam 3	.453**	.643**	-										
Exam 4	.399**	.447**	.496**	-									
TrAnx	.049	.065	.131	.152*	-								
TAnx1	.005	-.046	.008	.013	.355**	-							
TAnx2	-.053	-.190**	-.148*	-.103	.306**	.644**	-						
TAnx3	-.032	-.154*	-.160*	-.079	.294**	.597**	.799**	-					
PersEff1	.128	.151*	.129	.061	-.051	-.096	-.095	-.127	-				
PersEff2	.074	.196**	.196**	.037	-.046	-.088	-.104	-.129	.447**	-			
PersEff3	.091	.179*	.153*	.006	-.111	-.175*	-.180**	-.196**	.378**	.623**	-		
HS GPA	.032	-.013	-.055	.119	-.025	-.107	-.068	.002	-.060	.045	.059	-	
ACT	.467**	.476**	.447**	.406**	.090	-.148	-.305**	-.244**	.061	.128	.157*	.449**	-

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

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Table 11.

Effects of Experimental Conditions on Test Anxiety

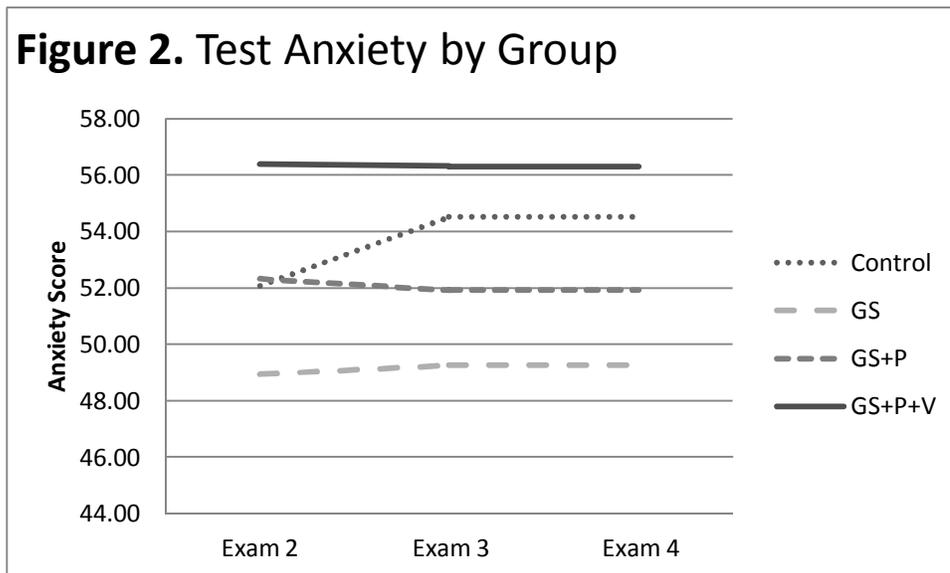
Source	SS	df	MS	F	Critical F
Between Subjects	138819.76	203			
A (Group)	3724.34	3	1241.45	1.84	2.65
A1	377.03	1	377.03	0.56	3.89
A2	3045.30	1	3045.30	4.51	3.89
A3	302.01	1	302.01	0.45	3.89
Subjects w/ A	135095.42	200	675.48		
Within Subjects	38528.00	408			
B (Test)	1135.53	2	567.76	6.16	3.00
B1	1106.94	1	1106.94	12.00	3.86
B2	28.59	1	28.59	0.31	3.86
AB	494.80	6	82.47	0.89	2.10
AB1	201.42	1	201.42	2.18	3.86
AB2	0.22	1	0.22	0.00	3.86
AB3	163.16	1	163.16	1.77	3.86
AB4	122.99	1	122.99	1.33	3.86
AB5	0.65	1	0.65	0.01	3.86
AB6	6.35	1	6.35	0.07	3.86
B * Subjects w/ A	36897.67	400	92.24		
Total	177347.76	611			

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Table 12.

Reported Anxiety Means and SDs

Group	TestAnx2		TestAnx3		TestAnx4		Group Totals	
	M	SD	M	SD	M	SD	M	SD
Control	52.08	18.43	54.51	19.22	54.51	19.22	53.05	18.36
GS	48.94	13.96	49.25	15.06	49.25	15.06	48.42	14.59
GS+P	52.31	16.47	51.92	18.74	51.92	18.74	50.41	17.65
GS+P+V	56.39	15.92	56.31	16.53	56.31	16.53	54.88	16.75
Total	52.43	16.37	53.00	17.54	53.00	17.54	51.69	17.04



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Table 13.

Effects of Experimental Conditions on Personal Efficacy

Source	SS	df	MS	F	Critical F
Between Subjects	142.15	203			
A (Group)	0.97	3	0.32	0.46	2.65
A1	0.47	1	0.47	0.66	3.89
A2	0.05	1	0.05	0.07	3.89
A3	0.45	1	0.45	0.64	3.89
Subjects w/ A	141.18	200	0.71		
Within Subjects	75.58	408			
B (Test)	0.75	2	0.38	2.07	3.00
B1	0.09	1	0.09	0.48	3.86
B2	0.66	1	0.66	3.65	3.86
AB	2.12	6	0.35	1.95	2.10
AB1	0.22	1	0.22	1.21	3.86
AB2	0.02	1	0.02	0.13	3.86
AB3	0.15	1	0.15	0.82	3.86
AB4	0.01	1	0.01	0.03	3.86
AB5	0.88	1	0.88	4.82	3.86
AB6	0.85	1	0.85	4.66	3.86
B * Subjects w/ A	72.71	400	0.18		
Total	217.74	611			

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Table 14.

Reported Personal Efficacy Means and SDs

Group	PersEff2		PersEff3		PersEff4		Group Totals	
	M	SD	M	SD	M	SD	M	SD
Control	3.55	.56	3.46	.61	3.46	.61	3.47	.61
GS	3.49	.57	3.61	.54	3.61	.54	3.56	.53
GS+P	3.57	.51	3.44	.52	3.44	.52	3.49	.54
GS+P+V	3.66	.63	3.44	.63	3.44	.63	3.55	.68
Total	3.57	.57	3.49	.58	3.49	.58	3.52	0.60

Discussion

The purpose of the study was to investigate the possible utility of visualization for the academic performance on college students. Unfortunately, I failed to find support for the proposed hypotheses. I failed to find a statistically significant difference between the exam scores of the group implementing visualization and the groups implementing goal setting and planning on the three separate exams. This finding also meant I was unable to test the third and fourth hypotheses concerning the mediation of visualization effects on academic performance by text anxiety and self-efficacy. My results are similar to those obtained by Pham and Taylor (1999). Pham and Taylor found that an experimental condition utilizing visualization showed improved test scores over a control condition, but the difference was not significant. The contributions of my study to the literature might derive more from what I failed to observe than from what I found.

Theoretical Implications and Future Research Directions

Goal Setting. I failed to find a significant effect for goal setting on exam performance. The literature has shown that goal setting has a robust effect; research consistently and reliably has shown that goal setting improves performance in a number of domains (Mento, Steel, & Karen, 1987; Wood Mento, & Locke, 1987). This makes failing to find a significant effect surprising. It is possible that goal commitment was not high. This could have been problematic given that goal commitment is known to moderate the effects of goal setting. However, my results revealed a mean goal commitment score of 16.34 ($SD = 2.82$) out of a possible maximum score of 20, reflecting moderate to high goal commitment, even though the goal setting groups differed somewhat in their levels of commitment (see p. 31).

To examine further possible explanations for my failure to observe a goal setting effect, I also examined whether goal commitment levels were related to exam performance. Certainly, prior research has demonstrated that goal commitment influences performance (e.g., Locke & Latham, 1990). I examined simple bivariate correlations between reported goal commitment and scores on each exam. However, only goal commitment on Exam 2 was significantly related to exam performance, $r = .169, p < .05$. Finally, in a measure completed at the end of the study, only 10 students of the 153 across the three goal setting groups indicated that they did not try to reach their set goals.

It is also possible that the participants in this study were not setting particularly difficult goals for themselves. If the students were not setting difficult goals, then this could have mitigated the effects of goal setting. However, my results revealed a mean of 89.12 ($SD = 6.01$) for goals set for exam scores (i.e., percentage of points earned), again reflecting the choice of at least moderately difficult goals, and the three goal setting groups did not differ in the levels of

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goals they set, $F(2, 150) = .56, p > .05$. Finally, based on the assumption that the goal levels chosen by participants should relate to performance, I examined bivariate correlations between goals chosen and performance on each exam. I observed that goal choice (assessed prior to each exam) was correlated with performance on Exam 3, $r = .35, p < .05$, but not with performance on Exam 2, $r = .13, p > .05$, or Exam 4, $r = .13, p > .05$.

Another possible explanation is that individuals in the control group were as likely to set goals as participants in the goal setting groups. Indeed, it would have been useful to compare the goals chosen and the goal commitment of individuals in the goal setting groups versus the control group, but asking individuals in the control group about their goals or commitment levels might have cued them to set goals. However, regardless of whether participants in the control group were setting goals, participants in the four experimental conditions in general performed poorly on each of the three exams, i.e., scoring only 60-70% of the points possible.

In summary, participants in the goal setting conditions reported at least moderately high goal commitment, stated that they were trying to reach their goals, and chose at least moderately difficult goals, but goal commitment and goal choice were at best weakly related to exam performance. Together, these observations suggested that there was something unusual about the context of the current study that constrained the usually robust goal setting effect.

Thus, other possible explanations for the failure to observe a significant effect for goal setting relate to the structure of the course. Because the students were allowed five attempts for each exam, students might not have seen the first attempt as important. Thus, students might not have been motivated to do well on the first attempt. I might then have seen a stronger effect of the goal setting manipulation on later exam attempts, compared to the first attempt. Similarly, because there was only one attempt allowed on the final exam, I might have observed a stronger

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goal setting effect on the final exam. However, instructors might design their course to use mid-term quizzes as learning opportunities and thus scores on those quizzes might not be as important as the hope that the learning acquired through those quizzes translates into performance on the final exam.

In sum, I might have observed a stronger effect for goal setting if the participants were taking a course that was more traditionally structured with one or a few midterms and one final exam and only one attempt allowed for each test. However, performance on tests in college courses reflects complex task performance, and prior research has indicated weaker goal setting effects on complex than on simple tasks (e.g., Locke & Latham, 1990). Thus, asking individuals to set a goal regarding the exam score they want to attain might have been less effective than asking individuals either to “do their best” (a nonspecific goal) or to set goals relating more to strategies they might use to perform well.

Planning. Similar to the goal setting intervention, the implementation of planning should have benefited exam performance and increased the beneficial effects of goal setting (Locke et al., 1997). However, I observed no significant differences in exam performance between the groups implementing planning and the other groups. Possibly, students did not choose a sufficient number of behaviors to successfully improve exam scores. However, my results revealed a mean of 4.87 planning behaviors chosen ($SD = 5.17$), more than the minimum of 3 planning behaviors I asked students to select, which suggests that students were influenced to engage in planning. Another possibility is that students failed to follow through on the plans that they made. However, in a measure completed at the end of the study, only 8 of the 102 participants in the two planning groups reported not putting forth any effort to follow their plans.

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Finally, although the planning groups did not perform better than the groups not asked to plan, it is possible that participants who engaged in higher levels of planning performed better. Thus, I examined bivariate correlations between the number of planning behaviors chosen and scores on each exam. The correlations revealed no significant relationships between reported levels of planning and exam performance with r 's of .103, .049, and -.098, p 's > .05, with Exams 2, 3, and 4, respectively.

In summary, my results for planning were unexpected and similar to my results for goal setting. Although prior research (e.g., Locke et al., 1997) has suggested that planning benefits behavior, I was unable to detect beneficial effects for planning in the current study. That is, although my planning intervention did influence participants to engage in at least moderate levels of planning behavior and most participants reported putting forth effort to follow their plans, levels of planning were unrelated to exam performance. This again suggests that something in the context examined in the current study constrained the potential benefits of planning.

As mentioned in relation to goal setting above, possible explanations for the failure to observe a significant effect for planning might relate to the structure of the course. Because the students were allowed five attempts for each exam, students might not have seen the first attempt as important. Thus, students might not have been motivated to do well on the first attempt. I might then have seen a stronger effect of the planning manipulation on second or third exam attempts, compared to the first attempt. Similarly, because there was only one attempt allowed on the final exam, I might have observed a stronger planning effect on the final exam. Further, I might have observed a stronger effect for planning if the participants were taking a course that was more traditionally structured with one or a few midterms and one final exam and only one

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attempt allowed for each test. Finally, as mentioned above, performance on exams in a college course reflects a complex task. As such, perhaps asking participants to make plans is similar to asking them to set difficult specific goals, i.e., just making the plans or setting difficult goals might have little effect on performance. Perhaps in such a context, one must train participants how to develop and implement plans in order for planning to benefit performance.

Visualization. I failed to observe that visualization improved exam performance. Prior research has found a significant effect for visualization improving performance in athletic contexts (Driskell, Copper, & Moran, 1994; Feltz & Landers, 1983). Research has found visualization to reduce anxiety and improving self-efficacy in clinical contexts as well (Rivkin & Taylor, 1996; Hupert & Roth, 2003). My non-significant results might have reflected that participants in this study did not follow the instructions given to engage in visualization for 5 minutes every day. Indeed, my data showed that 16 of the 51 students in the visualization group indicated that they did not engage in visualization. Thus, there is evidence that my visualization induction was not effective.

In future research, researchers might examine different features of visualization interventions and individual differences to determine types of visualization that work well in different settings and with different people. For example, visualization requires routine practice for it to be truly effective and for the person utilizing it to become more proficient at it. It is also possible that participants in the current study engaged in some kind of outcome based visualization, which Pham and Taylor (1999) suggested can be detrimental to performance, and other types of visualization might be more beneficial. Additionally, one might examine the usefulness of other operational definitions for visualization. I used a variation of time spent visualizing, but other criteria, such as total words written if there is any type of diary kept or the

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kinds of words participants use in a diary might better reflect participants' use of visualization. Along the same lines it might be that different types of visualization are motivating for different people. For example, individuals who are more avoidance oriented might find visualizing failure is more motivating than visualizing success. Finally, visualization might have stronger beneficial effects in physical activities, compared to the cognitive activities in my study. Indeed, there is a large stream of research providing evidence of the significant, beneficial effects of visualization for physical applications (e.g., Fournier, 2005; Feltz & Landers, 1983; Sheard & Golby, 2006). There is no such evidence of beneficial effects for cognitive applications.

Practical Implications

Given the paucity of effects in my research, it is difficult to offer many practical implications. Again, the strongest implications seem to relate to understanding the role of context in constraining motivational interventions, such as goal setting and planning. As mentioned above, the complexity of the task might have made it difficult to observe effects from my motivational interventions. Alternatively, the exams (at least the first attempts) might not have been important or salient to participants. In a related vein, participants might have been using the first attempts on each exam to get a baseline score or for some other purpose that conflicted with getting high scores on each exam. The conclusion, if any can be drawn, is that instructors designing courses need to consider the implications of their design choices and whether the structure of the course is helping the instructor achieve his/her objectives.

Limitations

There are some limitations inherent in this study. It is possible that the manipulations were not strong enough to elicit a significant effect although evidence suggests that goal commitment, goal choice, and planning behavior moderate to high. If this were the case, it

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would mask any effects that actually exist. There were also structural features of the course that might have made motivational interventions relatively unimportant. For example, the number of course components used to calculate students' grades could have impacted how much students cared about performance on each exam. It is possible also that the measures of the manipulations' effects or the manipulations themselves could be improved.

Specifically in relation to visualization, I did not implement a daily log or journal for participants in the visualization condition as was done in the Taylor studies. Due to the longitudinal nature of the current study, such a log would have been taxing on participants time and not practical. However, this could provide the participants with better practice and improve visualization skills over just taking the time to visualize the event in his or her mind. This lack of a log or journal of any kind also means the participants could have completely failed to utilize visualization as instructed without my knowledge during the duration of the study.

The pool from which the participants were taken from could also have made finding significant results difficult because participants might have lacked the proper motivation to succeed either in the course that this study examined or college in general. Given that many of the students were first term freshman, many might not be ready for college life and the rigors of study required to succeed at the college level. One particularly unique aspect of the university at which I conducted this study is the implementation of "learning communities". These learning communities are groups of new freshmen students who share the same major, pick many of the same courses, and meet regularly with each other to study. The belief in providing these learning communities is that they will facilitate students in making new friends in a new college environment, adjust to college more quickly, lower stress about school, and earn a higher GPA. It would be interesting to investigate the utility that these learning communities actually provide

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students and if they do accomplish what the university suggests they do compared to incoming freshman students who do not participate in these communities.

Conclusion

In conclusion, I failed to find a significant effect of using visualization to increase the academic performance of college students. Further, I failed to observe goal setting or planning effects. Surprisingly, goal commitment, goal choice, and planning had little effect on exam performance, contradicting substantial prior research. I suggest that unique features of the course might have made motivation interventions less relevant to students, either because the task was too complex for these interventions to work without support and training provided to participants or perhaps because no single element in the course (such as the first attempt on a single exam when one can attempt that exam up to five times) is important enough to be influenced by motivational interventions. In relation to the latter, instructors might design their course to use mid-term quizzes as learning opportunities, and thus scores on those quizzes might be less important than the hope that the learning acquired through those quizzes translates into performance on the final exam. Thus, perhaps my results most strongly indicate the importance of instructors designing their courses to best match their course objectives.

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Appendix A Goal Setting Manipulation

We are interested in tracking the progress of students in this PSY 105 course as it is being redesigned to assess the effectiveness of the new methods being used. For the purposes of this experiment, you will be asked to set a goal for your first exam and final grade in your PSY 105 course. Research has shown that setting specific and difficult, yet attainable, goals can be very effective in aiding people to perform better in school. If you set a goal for yourself and commit to that goal for the entire quarter, you should do better in your course than you would have otherwise. Make sure you choose a grade that will not be easy for you to attain but one that also will not be impossible. Also, we would like to follow up with you after each exam so that you can report your exam score and submit a goal for the next exam.

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Appendix B Goal Choice

INSTRUCTIONS: Below you are to choose a goal grade for your next exam in PSYC 105 and for your final grade in the course. Indicate your goal grades on a 0-100 percentage scale.

Goal for next exam: _____

Goal for final average: _____

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Appendix C Goal Commitment

INSTRUCTIONS: Below are statements describing people's feelings about goals. Please use the rating scale below to describe how accurately each statement describes your feelings about the goals you have just chosen.

1	2	3	4	5
Strongly Disagree	Moderately disagree	Neutral	Moderately Agree	Strongly Agree

1. It's hard to take this goal seriously.
2. It's unrealistic for me to expect to reach this goal.
3. It is quite likely that this goal may need to be revised, depending on how things go.
4. Quite Frankly, I don't care if I achieve this goal or not.

Scoring: Scores are totaled. Items were reverse scored.

From: Hollenbeck, Klein, O'Leary, & Wright, 1989.

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Appendix D Goal Setting and Planning Manipulation

We are interested in tracking the progress of students in this PSY 105 course as it is being redesigned to assess the effectiveness of the new methods being used. For the purposes of this experiment, you will be asked to set a goal for your first exam and final grade in your PSY 105 course and to decide on a plan for how you expect to reach those goals. Research has shown that setting specific and difficult, yet attainable, goals can be very effective in aiding people perform better in school. If you set a goal for yourself and commit to that goal for the entire quarter, you should do better in your course than you would have otherwise. Make sure you choose a grade that will not be easy for you to attain but one that also will not be impossible.

After you have chosen a goal for yourself, outline a plan for how you will go about reaching that goal. Consider things such as studying in a quiet environment, dedicating a certain block of time to studying/reading each day, going to supplemental instruction, reading all assigned material, avoiding distractions (TV, friends, Facebook) while studying, getting adequate sleep before exams, taking notes in lecture, doing all possible extra credit, sitting in the front row during lectures, going to every lecture, doing assigned readings before lecture, and/or going to lecture with a set of questions. Also, we would like to follow up with you after each exam so that you can report your exam score and submit a goal for the next exam.

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Appendix E Planning Choice

INSTRUCTIONS: You need to develop a plan for how you are going to attain the goals you have chosen. Please report how much time you plan to spend reading the course material in preparation for the next exam as well as how much time you plan to spend studying for the next exam. Also, below are some behaviors you can use to prepare for the next exam. Select 3 or more behaviors that you plan to use.

- | | |
|--------------|--|
| _____ | 1. Hours per week I plan to spend reading course material |
| _____ | 2. Total hours I plan to spend studying for the next exam |
| Yes___ No___ | 3. Studying in a quiet environment |
| Yes___ No___ | 4. Dedicating a certain block of time to studying/reading each day |
| Yes___ No___ | 5. Going to supplemental instruction |
| Yes___ No___ | 6. Reading all assigned material |
| Yes___ No___ | 7. Avoiding distractions (TV, friends, Facebook) while studying |
| Yes___ No___ | 8. Getting adequate sleep before exams |
| Yes___ No___ | 9. Taking notes in lecture |
| Yes___ No___ | 10. Doing all possible extra credit |
| Yes___ No___ | 11. Sitting in the front row during lectures |
| Yes___ No___ | 12. Going to every lecture |
| Yes___ No___ | 13. Doing assigned readings before lecture |
| Yes___ No___ | 14. Going to each lecture with a set of questions |
| Yes___ No___ | 15. Attend my PSY 105 lab every week |
| Yes___ No___ | 16. Connect lab content with lecture content |
| Yes___ No___ | 17. Other _____ |
| Yes___ No___ | 18. Other _____ |

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Appendix F Goal Setting, Planning, and Visualization Manipulation

We are interested in tracking the progress of students in this PSY 105 course as it is being redesigned to assess the effectiveness of the new methods being used. For the purposes of this experiment, you will be asked to set a goal for your first exam and final grade in your PSY 105 course and to decide on a plan for how you expect to reach those goals. Research has shown that setting specific and difficult, yet attainable, goals can be very effective in aiding people perform better in school. If you set a goal for yourself and commit to that goal for the entire quarter, you should do better in your course than you would have otherwise. Make sure you choose a grade that will not be easy for you to attain but one that also will not be impossible.

After you have chosen a goal for yourself, outline a plan for how you will go about reaching that goal. Consider things such as studying in a quiet environment, dedicating a certain block of time to studying/reading each day, going to supplemental instruction, reading all assigned material, avoiding distractions (TV, friends, Facebook) while studying, getting adequate sleep before exams, taking notes in lecture, doing all possible extra credit, sitting in the front row during lectures, going to every lecture, doing assigned readings before lecture, and/or going to lecture with a set of questions.

After you have decided on your plan of action, we would like for you to spend at least 5 minutes a day visualizing your plan and studying in such a way that would allow you to reach your goal. It is important that you see yourself in your own mind studying and following your plans in as detailed a manner as you possibly can. The more detailed your visualizations are the more effective the visualizations will be. Also, we would like to follow up with you after each exam so that you can report your exam score and submit a goal for the next exam.

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Appendix G Test Anxiety Inventory

INSTRUCTIONS: A number of statements which people have used to describe how they feel while taking a test are given below. Read each statement and then indicate the appropriate value using the scale below to indicate how you feel. There is no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

1	2	3	4
Almost Never	Sometimes	Often	Almost Always

1. During tests I feel very tense.
2. I wish examinations did not bother me so much.
3. I seem to defeat myself while working on important tests.
4. I feel very panicky when I take an important test.
5. During examinations I get so nervous that I forget facts I really know.

Scoring: Scores are totaled and multiplied by 4

From: Taylor & Deane, 2002

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Appendix H
Personal Efficacy Beliefs Scale

INSTRUCTIONS: Think about your ability to do the tasks required at school. When answering the following questions, answer in reference to your own personal skills and ability to perform in school using the scale below.

1	2	3	4	5
Strongly Disagree	Moderately disagree	Neutral	Moderately Agree	Strongly Agree

1. I have confidence in my ability to do well in school.
2. There are some tasks required by my classes that I cannot do well.*
3. When my grades are poor, it is due to my lack of ability.
4. I doubt my ability to do well in school.*
5. I have all the skills needed to perform well in school.
6. Most people in my classes get better grades than I do.*
7. I am a great student.
8. My future in school is limited because of my lack of skills.*
9. I am very proud of my skills and abilities in school.
10. I feel threatened when others watch me take a test or do homework.*

*Reverse scored

Scoring: Scores are averaged

From: Riggs, Warka, Babsa, Betancourt, & Hooker, 1994

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Appendix I Balanced Inventory of Desirability Responding

INSTRUCTIONS: Using the scale below as a guide, write a number beside each statement to indicate how much you agree with it.

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

1. My First impressions of people usually turn out to be right.
2. It would be hard for me to break any of my bad habits.*
3. I don't care to know what other people really think of me.
4. I have not always been honest with myself.*
5. I always know why I like things.
6. When my emotions are aroused, it biases my thinking.*
7. Once I've made up my mind, other people can seldom change my opinion
8. I am not a safe driver when I exceed the speed limit.*
9. I am fully in control of my own fate.
10. It's hard for me to shut off a disturbing thought.*
11. I never regret my decisions.
12. I sometimes lose out on things because I can't make up my mind soon enough.*
13. The reason I vote is because my vote can make a difference.
14. My parents were not always fair when they punished me.*
15. I am a completely rational person.
16. I rarely appreciate criticism.*
17. I am very confident in my judgments.
18. I have sometimes doubted my ability as a lover.*
19. It's all right with me if some people happen to dislike me.
20. I don't always know the reasons why I do the things I do.*
21. I sometimes tell lies if I have to.*
22. I never cover up my mistakes.
23. There have been occasions when I have taken advantage of someone.*
24. I never swear.
25. I sometimes try to get even rather than forgive and forget.*
26. I always obey laws, even if I'm unlikely to get caught.
27. I have said something bad about a friend behind his or her back.*
28. When I hear people talking privately, I avoid listening.
29. I have received too much change from a salesperson without telling him or her.*
30. I always declare everything at customs.
31. When I was young I sometimes stole things.*
32. I have never dropped litter on the street.
33. I sometimes drive faster than the speed limit.*
34. I never read sexy books or magazines.
35. I have done things that I don't tell other people about.*
36. I never take things that don't belong to me.

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- 37. I have taken sick-leave from work or school even though I wasn't really sick.*
- 38. I have never damaged a library book or store merchandise without reporting it.
- 39. I have some pretty awful habits.*
- 40. I don't gossip about other people's business.

Items 1-20 assess social deception enhancement.

Items 21-40 assess impression management.

Scoring: Add one point for every response of "6" or "7" and total for social deception enhancement and impression management.

* Reverse scored items

From: Paulhus, 1991

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Appendix J
International Personality Item Pool

INSTRUCTIONS: Below are phrases describing people's behaviors. Please use the rating scale below to describe how accurately each statement describes *you*. Describe yourself as you generally are now, not as you wish to be in the future.

	1	2	3	4	5
	Strongly Disagree	Moderately disagree	Neutral	Moderately Agree	Strongly Agree
1.	Often feel blue. (N)				
2.	Feel comfortable around people. (E)				
3.	Believe in the importance of art. (O)				
4.	Have a good word for everyone. (A)				
5.	Am always prepared. (C)				
6.	Rarely get irritated. (N)*				
7.	Have little to say. (E)*				
8.	Am not interested in abstract ideas. (O)*				
9.	Have a sharp tongue. (A)*				
10.	Waste my time. (C)*				
11.	Dislike myself. (N)				
12.	Make friends easily. (E)				
13.	Have a vivid imagination (O)				
14.	Believe that others have good intentions. (A)				
15.	Pay attention to details. (C)				
16.	Seldom feel blue. (N)*				
17.	Keep in the background. (E)*				
18.	Do not like art. (O)*				
19.	Cut others to pieces. (A)*				
20.	Find it difficult to get down to work. (C)*				
21.	Am often down in the dumps. (N)				
22.	Am skilled in handling social situations. (E)				
23.	Tend to vote for liberal political candidates. (O)				
24.	Respect others. (A)				
25.	Get chores done right away. (C)				
26.	Feel comfortable with myself. (N)*				
27.	Would describe my experiences as somewhat dull. (E)*				
28.	Avoid philosophical discussions. (O)*				
29.	Suspect hidden motives in others. (A)*				
30.	Do just enough work to get by. (C)*				
31.	Have frequent mood swings. (N)				
32.	Am the life of the party. (E)				
33.	Carry the conversation to a higher level. (O)				
34.	Accept people as they are. (A)				

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35. Carry out my plans. (C)
36. Am not easily bothered by things. (N)*
37. Don't like to draw attention to myself. (E)*
38. Do not enjoy going to art museums. (O)*
39. Get back at others. (A)*
40. Don't see things through. (C)*
41. Panic easily. (N)
42. Know how to captivate people. (E)
43. Enjoy hearing new ideas. (O)
44. Make people feel at ease. (A)
45. Make plans and stick to them. (C)
46. Am very pleased with myself. (N)*
47. Don't talk a lot. (E)*
48. Tend to vote for conservative political candidates. (O)*
49. Insult people. (A)*
50. Shirk my duties. (C)*

Neuroticism - (N)

Extraversion - (E)

Openness - (O)

Agreeableness - (A)

Conscientiousness - (C)

*Reverse scored items.

Scoring: Average all values for each personality trait to obtain scores.

From: International Personality Item Pool: A Scientific Collaboratory for the Development of Advanced Measures of Personality Traits and Other Individual Differences (<http://ipip.ori.org/>).

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Appendix K Positive Affectivity/Negative Affectivity Scale

INSTRUCTIONS: Below are a number of words that describe different feelings and emotions. Read each item and then indicate the appropriate response in the space next to that word. Indicate to what extent you generally feel this way, that is, how you feel on average. Use the following rating scale to record your answers.

1	2	3	4	5
Very slightly or not at all	A little	Moderately	Quite a bit	Extremely
1. Interested				
2. Distressed				
3. Excited				
4. Upset				
5. Strong				
6. Guilty				
7. Scared				
8. Hostile				
9. Enthusiastic				
10. Proud				
11. Irritable				
12. Alert				
13. Ashamed				
14. Inspired				
15. Nervous				
16. Determined				
17. Attentive				
18. Jittery				
19. Active				
20. Afraid				

Items 1,3,5,9,10,12,14,16,17,19 assess positive affectivity

Items 2,4,6,7,8,11,13,15,18,20 assess negative affectivity

Scoring: Scores are totaled for positive and negative affectivity

From: Watson, Clark, & Tellegen, 1988

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Appendix L Trait Anxiety Inventory

INSTRUCTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then indicate the appropriate value using the scale below to indicate how you *generally* feel. There is no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

1	2	3	4
Almost Never	Sometimes	Often	Almost Always

1. I feel pleasant*
2. I feel nervous and restless
3. I feel satisfied with myself*
4. I wish I could be as happy as others seem to be
5. I feel like a failure
6. I feel rested*
7. I am "calm, cool and collected"*
8. I feel that difficulties are piling up so that I cannot overcome them
9. I worry too much over something that doesn't really matter
10. I am happy*
11. I have disturbing thoughts
12. I lack self-confidence
13. I feel secure*
14. I make decisions easily*
15. I feel inadequate
16. I am content*
17. Some unimportant thought runs through my mind and bothers me
18. I take disappointments so wholeheartedly that I can't put them out of my mind
19. I am a steady person*
20. I get in a state of tension or turmoil as I think over my recent concerns and interests

* Reverse scored item

Scoring: Scores are totaled

From: Spielberger, 1983

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Appendix M Proactive Personality

INSTRUCTIONS: Below are statements describing people's behaviors. Please use the rating scale below to describe how accurately each statement describes *you*. Describe yourself as you generally are now, not as you wish to be in the future.

1	2	3	4	5	6	7
Strongly Disagree			Neutral			Strongly Agree
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						
13.						
14.						
15.						
16.						
17.						

*Reverse scored items

Scoring: Scores are totaled

From: Bateman & Crant, 1993

Appendix N
Personal Initiative

INSTRUCTIONS: Below are phrases describing people’s behaviors. Please use the rating scale below to describe how accurately each statement describes *you*. Describe yourself as you generally are now, not as you wish to be in the future.

1	2	3	4	5
Strongly Disagree	Moderately disagree	Neutral	Moderately Agree	Strongly Agree

1. I actively attack problems.
2. At the moment, it is not useful to make any plans.
3. Whenever something goes wrong, I search for a solution immediately.
4. I will be able to manage without making any career plans.
5. Whenever there is a chance to get actively involved, I take it.
6. It is still too early to make plans for my future career.
7. I take initiative immediately even when others don’t.
8. My occupational maxim is: let’s wait and see.
9. I use opportunities quickly in order to attain my goals.
10. It is no good to actively start to change my occupation now.
11. Usually, I do more than I am asked to do.
12. In the present situation it is useless to implement career plans.
13. I am particularly good at realizing ideas.
14. I only make plans when I know what is going to happen in the future.

Odd numbered items assess self-reported initiative
Even numbered items assess passivity

Scores are averaged

From: Frese, Fay, Hilburger, Leng, & Tag, 1997

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Appendix O Perceived Social Support - Family

INSTRUCTIONS: The statements which follow refer to feelings and experiences which occur to most people at one time or another in their relationships with their families. For each statement there are three possible answers: Yes, No, Don't know. Please indicate the answer you choose for each item.

1. My family gives me the moral support I need. _____
2. I get good ideas about how to do things or make things from my family _____
3. Most other people are closer to their family than I am. _____
4. When I confide in members of my family who are closest to me, I get the idea that it makes them uncomfortable. _____
5. My family enjoys hearing about what I think. _____
6. Members of my family share many of my interests. _____
7. Certain members of my family come to me when they have problems or need advice. _____
8. I rely on my family for emotional support. _____
9. There is a member of my family I could go to if I were just feeling down, without feeling funny about it later. _____
10. My family and I are very open about what we think about things. _____
11. My family is sensitive to my personal needs. _____
12. Members of my family come to me for emotional support. _____
13. Members of my family are good at helping me solve problems. _____
14. I have a deep sharing relationship with a number of members of my family. _____
15. Members of my family get good ideas about how to do things or make things from me. _____
16. When I confide in members of my family, it makes me uncomfortable. _____
17. Members of my family seek me out for companionship. _____
18. I think that my family feels that I'm good at helping them solve problems. _____
19. I don't have a relationship with a member of my family that is as close as other people's relationships with family members. _____
20. I wish my family were much different. _____

Scoring: Scores indicating social support are scored +1 and are then totaled

From: Procidano & Heller, 1983

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Appendix Q Effort and Compliance (GS Group)

INSTRUCTIONS: Please answer the following questions completely truthfully. Your answer will not affect the amount of research participation credit you receive. The researchers want your honest answers to each of these questions.

Yes___ No___

Yes___ No___

the exam?

1. Did you honestly try to reach your goals?
2. Once you picked a goal for a given exam, did you ever change that goal prior to taking that exam?
3. If yes, on how many exams did you change your goal prior to taking the exam?

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Appendix R
Effort and Compliance (GS+P Group)

INSTRUCTIONS: Please answer the following questions completely truthfully. Your answer will not affect the amount of research participation credit you receive. The researchers want your honest answers to each of these questions.

- Yes___ No___ 1. Did you honestly try to reach your goals?
Yes___ No___ 2. Once you picked a goal for a given exam, did you ever change that goal
_____ prior to taking that exam?
_____ 3. If yes, on how many exams did you change your goal prior to taking
the exam?
Yes___ No___ 4. Did you put forth effort to follow your plans?
_____ 5. How many days a week did you actually follow your plan?
Yes___ No___ 6. Once you developed a plan for a given exam, did you ever change that
plan prior to taking that exam?
_____ 7. If yes, on how many exams did you change your plan prior to taking
the exam?

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Appendix S
Effort and Compliance (GS+P+V Group)

INSTRUCTIONS: Please answer the following questions completely truthfully. Your answer will not affect the amount of research participation credit you receive. The researchers want your honest answers to each of these questions.

- | | |
|--------------|---|
| Yes___ No___ | 1. Did you honestly try to reach your goals? |
| Yes___ No___ | 2. Once you picked a goal for a given exam, did you ever change that goal prior to taking that exam? |
| ___ | 3. If yes, on how many exams did you change your goal prior to taking the exam? |
| Yes___ No___ | 4. Did you put forth effort to follow your plans? |
| ___ | 5. How many days a week did you actually follow your plan? |
| Yes___ No___ | 6. Once you developed a plan for a given exam, did you ever change that plan prior to taking that exam? |
| ___ | 7. If yes, on how many exams did you change your plan prior to taking the exam? |
| Yes___ No___ | 8. Did you use visualization in preparing or studying for exams? |
| ___ | 9. How many days a week did you actually follow the instructions to visualize for 5 minutes? |

Appendix T
Informed Consent

The purpose of this research study is to examine investigate the effects of a redesign of the PSY 105 course. You are invited to complete several online questionnaires now and after each exam week has past throughout the quarter. These questionnaires should take no more than one and a half hours to complete in the first round and half an hour in each subsequent round. There is minimal risk and discomfort anticipated as part of or as a result of this research study. The primary risk is fatigue resulting from responding to the questionnaires. Clicking the “I Agree” button below and continuing with the questionnaires implies your consent to participate. In addition, by clicking “I Agree” you consent to allowing the researcher access to private student material from Wright State to obtain information such as to high school transcripts, standardized test scores, and Wright State GPA. Any information about you obtained from this study will be kept strictly confidential and you will not be identified in any report or publication. In exchange for participation, you will receive 1 research participation credit point per half hour towards one of your PSY 105 course. Completion of the study from start to finish will result in a total of 8 credits. You are free to refuse to participate in this study or to withdraw at any time. Your decision to participate or to not participate will not adversely affect your standing at this institution or cause a loss of benefits to which you might otherwise be entitled. There is no penalty of any kind for either non-participation or withdrawal at any time. A summary of the results of this study may be requested by contacting the researchers listed below by December 2013. The summary will show only aggregate (combined) data. No individual results will be available. If you have questions or concerns about this research study, you can contact the researcher, Brian Michael at michael.57@wright.edu, or the faculty advisor, Dr. Debra Steele-Johnson, at debra.steele-johnson@wright.edu. **If you have general questions about giving consent or your rights as a research participant in this research study, you can call the Wright State University Institutional Review Board at 937-775-4462.**

Brian Michael, Primary Investigator

Debra Steele-Johnson, Faculty Advisor

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Appendix U Waiver Form

We would like your permission to access your file in the Degree Audit Report System (D.A.R.S.) to get information regarding your high school and college GPA and standardized test score (ACT or SAT). Only the researchers will have access to this information. We will keep this information confidential. We will use your name only to access your DARS report. We will not include your name in our data files. You are not required to give the researcher access to your DARS report. You may refuse without negatively affecting your status with Wright State University, with the researchers, or your standing in this study. There is no penalty of any kind for refusing this request.

By typing my name in the box below, I give the experimenters, Brian Michael and/or Debra Steele-Johnson, permission to access my D.A.R.S. report and take the information described above from that report for their study. I understand that typing my name in the box is the same as my signature.

Name: _____

Appendix V
Debriefing

Thank you for participating in this study, the information provided by you over the course of the quarter will be invaluable to our research efforts. The researchers were not totally forthright about the purpose of this study at the beginning. For the purposes of the study, it was necessary to deceive you in this manner. The actual purpose of this study was to investigate the effectiveness of using visualization as a means of improving academic performance of college undergraduates above the level of currently known effective protocols (goal setting and planning). If participants were made aware of the actual aims of the study it could have biased their results. To reiterate, any information about you obtained from this study will be kept strictly confidential and you will not be identified in any report or publication. A copy of the study results can be made available by contacting one of the researchers below. The summary will show only aggregate (combined) data. No individual results will be available. If you have questions or concerns about this research study, you can contact the researcher, Brian Michael at michael.57@wright.edu, or the faculty advisor, Dr. Debra Steele-Johnson, at debra.steele-johnson@wright.edu.

Brian Michael, Primary Investigator

Debra Steele-Johnson, Faculty Advisor