2020-07-29

Mental Contrasting with Implementation Intentions to Lower Test Anxiety

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A thesis submitted to the faculty of
Brigham Young University
in partial fulfillment of the requirements for the degree of

Master of Arts

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ABSTRACT

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Learning a language can induce anxiety among students. In addition, students can feel anxious when it comes to being tested on their language skills. Studies of goal attainment among health patients, students, and others have shown that self regulation through the model of Mental Contrasting with Implementation Intentions (MCII) can help participants reach their goals. In the current study, we sought to determine whether MCII could help learners better cope with anxiety when being orally examined in a second language. Specifically, we examined whether practicing MCII would lead to reductions in language test taking anxiety over time. We compared the levels of test anxiety in students before and after a six-week period where one group was taught MCII and another was not. MCII participants were instructed on MCII in weekly sessions and encouraged to apply it in testing and other situations in their daily lives. Both the MCII group and the control group were given speaking tests at the beginning and end of the six weeks, and anxiety levels were tested at each of these speaking tests. Anxiety was measured using two methods: a self-assessment, the Foreign Language Anxiety Scale, and a physiological measure of anxiety, saliva cortisol level. All students were interviewed by a trained speaking rater, and their cortisol levels were tested before and after the testing experiences at the beginning and end of the study period. We compared anxiety levels for the treatment (MCII) and control groups. Results showed that cortisol levels among treatment and control groups did not have a significant difference. However, the experiment group that had received MCII treatment reported lower levels of anxiety than the control. This suggests that MCII can lower the level of test anxiety perceived by students.

Keywords: mental contrasting, test anxiety, second language learning

ACKNOWLEDGEMENTS

I would like to thank my supervisor Dr. Dan P. Dewey for guidance and support during this process. I would also like to thank the Turkish Fulbright Commission for their support.

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Introduction

Most students feel anxious in learning and testing environments. Anxiety (i.e., stress, worry, nervousness) is one of the most studied psychological variables in second language acquisition (SLA) research (MacIntyre, 2017). Definitions of anxiety are often very specific for a given piece of research. However, anxiety in most literature refers to feelings of fear, worry, and unease caused by external or internal potential threats (Grupe & Nitschke, 2013). In the setting of interest here, it is "the feeling of tension and apprehension specifically associated with second language [L2] contexts, including speaking, listening, and learning" (MacIntyre & Gardner, 1994, p. 284). More precisely, language test anxiety “refers to a type of performance anxiety stemming from a fear of failure on a test. Test-anxious students often put unrealistic demands on themselves and feel that anything less than a perfect test performance is a failure” (Horwitz, Horwitz & Cope, 1986, pp. 127-128). Anxiety manifests itself in the forms of both worry and of physiological tension. This thesis addresses the reduction of foreign language test anxiety, focusing on one specific method, mental contrasting with implementation intentions (MCII).

Review of Literature

To frame this research on MCII and help readers understand the nature of test anxiety and how MCII may influence it, this review of literature will address five key areas: 1) the construct of anxiety; 2) test anxiety and its effects on achievement; 3) foreign language anxiety; 4) self-regulation and anxiety reduction; 5) MCII as a method of self-regulation.

Anxiety as a Construct

In the field of clinical psychology, stress is typically viewed as a response to some demand placed upon a person that exceeds or appears to exceed the resources the person has for handling that demand (Folkman., 2013). The notion of resources exceeding demand is typical of

a testing situation where learners feel their knowledge base does not match what is expected for the exam. Anxiety has been a widely discussed topic by professionals of varying backgrounds and perspectives, and it has been defined in numerous different ways across the literature. Anxiety is referred to as an unpleasant emotion or affective state people feel when they encounter something they want to avoid (Carver & Scheier, 2001). In psychology literature, anxiety is often viewed as an emotional strain or tension that is typically accompanied by some physiological response: increased blood pressure, heart rate, or breathing rate; sweating; indigestion; or even muscular or joint pain (for descriptions, see Irving, Dobkin & Park, 2009). In the study of anxiety, it is often split into two categories being state and trait anxiety. State anxiety is the reaction to an adverse situation in a specific moment while trait anxiety can be a personality trait used to describe a person's individual differences when experiencing state anxiety. Therefore, trait anxiety is more stable over time and can be used as a characteristic of those with anxiety disorders (Leal, Goes, da Silva, & Teixeira-Silva, 2017). While anxiety can be clinical and is used to refer to that state in the literature on psychopathy, it is also typically viewed as worry about an event that is occurring, has occurred, or might occur, and might be viewed as an anticipatory stressor (Anisman, 2015). This “worry” can be accompanied by some of the same physiological signs as stress and may, therefore, increase one’s level of stress. One can think of stress as a response to stressors (demands exceeding current resources) and of anxiety (worry over stressors) as an additional stressor. Both stress and the anticipatory stressor of anxiety match well with the use of the term *anxiety* as typically seen in the SLA literature, and both align with the notion of anxiety found in the literature on test anxiety. Therefore, we will use the term *anxiety* interchangeably for stress here.

According to Arnold and Brown (1999), “anxiety is an affective factor that can be destructive to the learning process” (p. 9). It can consist of cognitive components, such as worry, and affective components, like emotional and physical symptoms (Zeidner, 1998). An example of an external manifestation of stress can be as in Buchanan et. al’s (2014) research where they found that L2 speakers showed more pauses when under stress compared to when they were not in a stressful situation. It can be assumed from this study that stress influences language and speech production. Additionally, anxiety can be categorized as both facilitating and debilitating. In some cases, small amounts of anxiety can motivate a learner to action, causing increased effort and achievement (Sperling, Reeves, Gervais & Sloan, 2017). In the cases where the effects of anxiety result in positive outcomes, like better concentration or better performance, test anxiety is considered facilitating.

Anxiety can be categorized as both facilitating and debilitating. In some cases, small amounts of anxiety can motivate a learner to action, causing increased effort and achievement (Spielman & Radnofsky, 2001; Sperling, Reeves, Gervais & Sloan, 2017). In the cases where the effects of anxiety result in positive outcome, like better concentration or better performance, test anxiety is facilitating. As most literature has shown, test anxiety is debilitating when connected to students’ academic achievement. However, most literature has focused on test anxiety as a debilitating factor when it comes to students’ academic achievement, and this could be labeled debilitating anxiety due to the negative effects. Often research into facilitating and debilitating anxiety has not been a particularly “useful” path (MacIntyre, 2017) and a great deal of literature has decried the idea of facilitative anxiety.

Test Anxiety and Achievement

Test anxiety is a subcategory of the more general concept of anxiety. It can be defined as the fear of being evaluated poorly in academic situations (Cizek & Burg, 2006), "Test anxiety refers to the individual's disposition to react with more intense tension, apprehension, nervousness, and worry and physiological arousal (state anxiety) when exposed to evaluative situations. Test-anxious students are generally higher in trait anxiety and tend to experience more excessive state anxiety under evaluative situations." (Sperling, Reeves, Gervais & Sloan, 2017, p. 2296). It can stem from many things like pressure from parents and teachers, poor time management, difficulty maintaining attention, and low confidence (Ritchwood, Carthron, & Decoster, 2015).

There is much research on anxiety and classroom learning, but there has also been considerable research in recent years on the relationship between anxiety and foreign language test performance and test performance in other domains (e.g., Cakici, 2016; Selehi & Marefat, 2014; Tsai & Li, 2012; Yavuz & Yeşilyurt, 2013). Studies regularly find significant negative correlations between anxiety and language achievement and/or test performance, but this is not always the case. Whether test anxiety falls into the category of foreign language anxiety or not can be its own discussion; however, it is generally accepted that test anxiety can directly affect test results and indirectly language learning.

Test anxiety most typically makes it hard for students to not only concentrate on test items but also to perform adequately on these items (Alemi, 2010; Naveh-Benjamin, McKeachie, Lin, & Holinger, 1981). Salehi and Marefat (2014) found that there was a negative correlation between students' levels of reported test anxiety and academic achievement. Students who had reported less test anxiety on the Foreign Language Classroom Anxiety Scale (FLCAS) and Test

Anxiety Scale (TAS) performed better on final exams than those who had higher levels of test anxiety.

Studies have long found negative relationships between the amount of test anxiety and academic performance (e.g., grade point average, or GPA), and researchers have also found that teaching learners how to cope with test-related anxiety can lead to better testing performance and better course grades over time (Allen, 1971; Putwain, 2008, Putwain & Pescod, 2017; Spielberger, Anton, & Bedell, 2015). There is much support for the idea that test anxiety has a significant stable negative impact on academic performance measures (Cassady & Johnson, 2002; Chapell, Blanding, Silverstein, Takahashi, Newman, Gubi,& McCann, 2005;Cohen, Ben-Zur, & Rosenfeld, 2008; Shobe, Brewin, & Carmack, 2005; Wine, 1971). However, we can also take into consideration that higher proficiency is found to be negatively correlated to test anxiety (Tsai & Li, 2012). It can be argued that low performance/proficiency can be a factor in foreign language anxiety and vice versa. Although it can be hard to pinpoint the exact reason for this as FLA can be a myriad of cognitive, affective, and demographic variables as well as interactions between these variables (Rodríguez & Abreu, 2003). Jin, Y., de Bot, K., & Keijzer, M. (2015) measured levels of FLA in students at the beginning and at the end of the semester for anxiety and proficiency in Japanese (foreign language). They found that as students' proficiency in Japanese increased, their anxiety was lower.

Foreign Language Anxiety and Foreign Language Learning

One type of anxiety that is specific to language learners is foreign language anxiety (FLA). Beginning with earlier literature concerning anxiety in foreign language learning situations the results were inconsistent. The results showed anxiety had been found to have both a negative and positive correlation to academic and language performance. This was due to

language-related anxiety not being defined well (Horwitz, 2017). In order to answer this need for better construct definition, Horwitz et al. (1986) presented the concept of language anxiety as "analogous" to, but not composed of, communication apprehension, testing anxiety, and fear of negative evaluation. Horwitz et al.'s (1986) study also found that language anxiety was independent of other types of anxiety. Similar to the definition mentioned above is one common qualification regarding FLA is that is it is different from general anxiety and stems from three main sources: 1) communication apprehension due to learners' inadequate ability to fully express themselves linguistically, 2) fear of being evaluated negatively in social situations, and 3) test anxiety (Horwitz, Horwitz & Cope 1986). However, MacIntyre and Gardner (1989) claimed that test anxiety is general and does not fall under the category of foreign language anxiety at all.

Another commonly used definition of FLA today is "the feeling of tension and apprehension specifically associated with second language contexts, including speaking, listening, and learning" (MacIntyre & Gardner, 1994, p. 284). FLA is, simply put, a term used for the negative emotions and worry related to an individual's foreign language learning process (MacIntyre & Gregersen, 2012). According to MacIntyre and Gardner (1989), foreign language anxiety is learned and is developed after students' attitudes toward learning the language are set. This means that when students have negative experiences with foreign language learning, foreign language anxiety may develop. As students continue to have these negative emotions towards foreign language learning, their anxiety will increase, and as a result their performance will decrease. Students' negative experiences with foreign language and the fear of poor performance or fear of failure increase anxiety. (MacIntyre & Gardner, 1991).

In his comprehensive overview on the topic of foreign language anxiety, MacIntyre (2017) divides the history of research regarding foreign language anxiety into three vague

periods or approaches, including the Confounded Approach, the Specialized Approach, and the Dynamic Approach. During the Confounded Approach most researchers were busy with the task of defining and measuring anxiety as a single construct in a way that was related to language learners. One review of the literature done by Scovel (1978) during this period mentions the need to better classify terms. It also goes into the need at the time to break anxiety down into separate components connected to language learning. During the Specialized Approach this need to better define, measure, and research anxiety for language learners was met. It was during the Specialized Approach period that Horwitz et al. (1986) described students' anxieties. These anxieties were mainly related to speaking aloud, frequent testing and being evaluated negatively in academic environments. The third period of MacIntyre's overview is the Dynamic Approach where anxiety was studied in connection with a complex web of language learning experiences where anxiety can be seen as interacting with many things like the learner, situation, environment, relationships, and even reactions. One example of a study that falls into the Dynamic Approach is Gregersen et al.'s (2014) study. In their study they combined heart rate monitors with the participant's ideodynamic ratings of state anxiety during their presentation in a post presentation interview as measures. Two very different measures of anxiety make said study a good example for this approach.

Many educators feel a negative impact on learning and performance in the classroom is a result of foreign language anxiety. In L2 educational settings, especially the classroom, anxiety can be debilitating to the process of learning. It is known to interfere with encoding, storage, and retrieval during language learning (MacIntyre, 1995). Under stress, an individual may have difficulty retrieving lexical information, resulting in potential for disfluencies and difficulty in speech production. For example, in one research study, L2 speakers showed more pauses when

under stress compared to when they were not in a stressful situation (Buchanan, Laures-Gore, & Duff, 2014). Tuncer and Doğan (2015) found that as foreign language anxiety increased, so did the rate of students' failures. Many studies conducted both in the home setting and abroad concluded that foreign language anxiety affects language learning negatively (MacIntyre & Gardner, 1994; Aida, 1994; Demirdaş, 2012; Elkhafaifi, 2005; Wang, 2011).

Language testing can also be a reason for students' anxiety in foreign language learning. Test anxiety relating to foreign language anxiety is a type of performance anxiety resulting from the fear of failure in academic settings that involve evaluation (Horwitz, 1986). This refers to the test anxiety students feel while taking foreign language exams where students are evaluated on their linguistics skills. This anxiety can be induced by invalid, ambiguous, and unfamiliar testing situations. Although there are many studies done on FLA and its effects on students, very few studies focus on the test anxiety component of FLA (Young, 1991). Marcos-Llina and Garau (2009) looked into the impact of foreign language anxiety on course achievement and found that language anxiety is negatively related to foreign language classroom achievement. It has been observed that there is a negative correlation between test anxiety and foreign language test performance (Salehi & Marefat, 2014). Since knowing about test anxiety in FLA can be important for teachers to improve the academic performance of their students, we can see that much research is needed in this area.

Self-regulation as Test Anxiety Interventions

There have been numerous attempts to facilitate learning and improve performance by reducing learners' anxiety levels in classroom and testing situations. There is much literature on interventions used for test anxiety however, the most common techniques are as follows: 1) study skills counseling sessions (e.g., teaching reading and writing techniques, note-taking,

utilizing learning styles); 2) relaxation therapy (e.g., meditation); 3) systematic desensitization (e.g., exposure to anxiety-related stimuli); 4) cognitive-behavioral therapy techniques (e.g., changing negative thought patterns into positive through self-awareness and reframing). Among the many different intervention techniques used to reduce test anxiety, we mentioned self-regulation-based interventions aimed specifically at test anxiety in this literature review as it ties in closely with MCII. Self-regulation is the ability to manage one's emotions and behavior effectively in goal-oriented behavior (Carver & Scheier, 2001). Brown (1998) defines it as the ability to plan, monitor and direct one's behavior in changing situations. It refers to self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals. Self-regulation is cyclical because it is the adjustment of strategies based on previous experiences in the environment.

Putwain and Pescod (2017), among others, implemented interventions using self-regulation methods in a cognitive and behavioral approach. These interventions consisted of identifying stress triggers and negative self-talk, replacing negative self-talk with positive self-talk, exercising relaxation skills, implementing study and test taking skills, and setting goals. It was found that this intervention method was effective in test anxiety reduction. Since self-regulation involves monitoring one's self. Students who use self-regulation are less stressed or anxious in testing situations (Zapata, 2017; Putwain, 2019). Another example of self-regulation being used as an intervention for test anxiety is the study done by Bradley, McCraty, Atkinson, Tomasino, Daugherty, and Arguelles (2010), who found that students who were taught a self-regulation technique in the form of positive emotion-focused techniques to handle stress and test anxiety learned how to better manage their emotions and to reduce their own stress levels under conditions such as testing. In this study, high school students learned the TestEdge program,

which teaches students about stress, emotions, the brain and how they interact with one another. This self-regulation method teaches students strategies for maintaining positive emotions, solving problems, and preparing for and taking tests, as well as techniques for self-regulating stress and anxiety during tests. As a result, students in the experiment group had lower heart rates, meaning they had lower levels of physiological reactions to the stressful circumstances. This was evident for both low- and high-test-anxiety subgroups. The fact that self-regulation was effective suggests that MCII, a tool for self-regulation, may be effective as well. MCII as a tool for self-regulation will be discussed in the next section.

MCII as a Method of Self-regulation

One innovative new method of self-regulation is mental contrasting with implementation intentions (Oettingen, 2000). Mental contrasting with implementation intentions (MCII) is a model that uses mental contrasting and self-regulation for goal commitment, keeping obstacles related to that goal in mind. Committing to a goal is necessary but not enough, as the goal may have obstacles (Bargh et al., 2010). This is why mental contrasting with implementation intentions can help close the gap between making goals and attaining them. The first step of MCII is for participants to state a desire they wish for in their lives, and then to imagine clearly the desired future that will happen if they accomplish that wish. Envisioning and pursuing this wish can be seen as part of goal commitment in self-regulation. After envisioning the wish, people reflect on the obstacles that stand in the way of reaching this desired future, such as stress. The last step is to plan to combat these obstacles, a means of managing one's emotions and behavior (Kappes, Oettingen, & Pak, 2012). When making this plan to combat the obstacles, if-then statements are typically used. The "if" statement will give the user guidance on when to act in relation to obstacles on the road to the goal, and the "then" statement will give specifics as

to what actions to take or how to respond to move toward one's goal (Oettingen & Wittchen, 2013).

MCII has been used in many areas of research, including interpersonal relationships and health. Fritzsche, Schlier, Oettingen, and Lincoln (2016) found that MCII increases goal-attainment, developing better mental health in individuals with mild to moderate depression. MCII as a self-regulation strategy has also improved self-discipline in adolescents preparing for university entrance exams so much so that the group using MCII completed 60% more practice questions (Duckworth, Grant, Loew, Oettingen, & Gollwitzer, 2011). In addition, it has promoted the processing of negative feedback. Participants were in a setting where they tried to solve problems as a group and were given both positive and negative feedback on their solutions. Participants using MCII could make and adjust plans according to the negative feedback given to their solution. This helped participants to form plans beneficial for goal pursuit. Furthermore, mental contrasting also protected the self-view of the participant's competence in problem solving even after receiving negative feedback (Kappes, Oettingen, & Pak, 2012). MCII has helped people manage their time (Oettingen, Mayer, & Brinkmann, 2010), engage in greater physical activity (Sheeran, Harris, Vaughan, Oettingen, & Gollwitzer, 2013), stop smoking (Oettingen, Mayer, & Thorpe, 2010), and self-regulate insecurity-based behaviors in personal relationships (Houssais, Oettingen, & Mayer, 2013). In the last study, Houssais et al. define insecurity-based behaviors as "self-perpetuating cycle of thoughts, feelings and behaviors." (p. 224). They connect this insecurity with anxiety, which suggests that MCII may be useful for the cycle of thought associated with anxiety-related worry mentioned earlier.

In educational fields, MCII has been used across all age groups, although most studies have focused on children. For instance, children taught how to apply MCII to their academic

wishes and concerns significantly improved their grades, attendance, and conduct (Duckworth, Kirby, Gollwitzer, & Oettingen, 2013). Similarly, Velasquez-Sheehy (2015), found a positive correlation between the MCII intervention and academic performance by looking at the end-of-quarter grades of high school students. Another study by Gawrilow, Morgenroth, Schultz, Oettingen, and Gollwitzer (2013) found that children benefited from MCII more than from a learning style intervention only, and the benefits of MCII were particularly strong for children at risk for ADHD. As we can see, there are relatively few studies dealing with the use of MCII in education among adults hence one of the rationales for this study. Though one study that does include education among adult learners found that self-regulation can also have a significant effect on reading comprehension (Maftoon & Tasnimi, 2014).

There are few known studies connecting MCII and L2 learning to date, but these existing studies (Oettingen, Pak, & Schnetter, 2001; Lee, Dewey, Brown, & Belnap, 2018; Brown, Dewey, Lee, Egget, in press) suggest MCII has the potential to influence goal-oriented language learning behavior and thereby enhance SLA by reducing test anxiety.

Rationale

As mentioned before, mental contrasting may reduce negative affect (i.e., stress and anxiety), promote positive affect, and enhance focus and attention in learning contexts. It has been found that a person can better control their behaviour when they are in critical situations by using MCII (Oettingen & Gollwitzer, 2010,) suggesting that students who use MCII will be better equipped to deal with test anxiety in language learning situations.

Self-regulation based strategies to reduce stress are not new. MCII has been shown to lower insecurity (negative feelings) in relationships. It has also been effective in helping students get better results in academics whether the result being better grades, concentration or effort.

MCII has yet been used to alleviate test anxiety. Seeing the results of previous studies done in different environments MCII may be a method that can be used to help negative feelings such as test anxiety in second language learners.

In this study, we sought to reduce test anxiety by teaching students to use MCII for test preparation or test taking for their language classes. While anxiety reduction techniques have been used in language classrooms and language testing situations (Contreras-Soto, Véliz-Campos, & Véliz, 2019), so far no studies have, to our knowledge, used MCII or other formal self-regulation approaches in conjunction with these stress reduction methods. As we implemented MCII and stress reduction techniques, we measured students' test anxiety levels two ways: using a traditional survey of test anxiety and sampling students' cortisol levels. Cortisol levels are physiological indicators of stress levels, and this measure will be discussed in greater detail along with the justification for the survey used in the Methods section. Previous studies have used self-reports to measure test anxiety or foreign language classroom anxiety, but no studies have used the more objective cortisol level as a stress/anxiety measure. We compared pre- and post-intervention (MCII instruction) results on both measures of test anxiety between the control and treatment group to determine the efficacy of MCII for test anxiety reduction. The questions we addressed using this data are as below.

Research Questions:

1. Is there any significant difference between the anxiety levels (as measured by self-assessment and cortisol levels) of a group taught MCII as a way of reducing test anxiety and a control group not taught MCII?
2. What is the relationship between self-reported levels of anxiety and cortisol levels, and objective physiological measure of anxiety?

3. Is there a significant difference between groups on speaking test score changes over the course of the semester (i.e., is there support for a possible indirect effect whereby anxiety levels decrease and speaking test performance therefore increases)?

Methods

In this study, we taught one group to use MCII and compared their test anxiety level development over time with a control group not taught MCII. Specifically, we measured anxiety levels surrounding oral proficiency testing at the beginning and end of a six-week period of language instruction and compared differences over time on these measures between groups.

Participants

The participants in this study were 25 English language learners at Brigham Young University's English Language Center (ELC). These students had various first language backgrounds and were between 17 and 50 years old with the average age being 24. All learners had been enrolled in the same level at the ELC. Speaking proficiency levels of these students are generally roughly at Intermediate High to Advanced Low on the ACTFL proficiency scale (ACTFL, 2012). We looked at LAT Speaking Scores to measure proficiency differences as the data in this study. Intermediate High to Advanced Low is an ideal level because speakers are proficient enough to express themselves clearly, but they can make mistakes which can critically affect communication of meaning at times. This feeling of not being able to completely express oneself clearly and mistake-free can make a person anxious. There were two groups in this study: a control group and an experiment/treatment group. The treatment group consisted of 11 students, and the control group consisted of 14 students. The control and treatment groups were made up

of one section each of the ELC's Academic B level, but only the treatment group received the MCII training described below.

The number of participants in each group was lower than optimal and did not yield high statistical power. Practicality (i.e., availability of research participants) limited size, so the decision was made to simply use two existing groups to explore the impact of MCII to determine its potential to benefit students enrolled in the program. Furthermore, it should be noted that comparable group sizes are not uncommon in studies of second language acquisition (SLA). Plonsky (2013) notes that the median sample size in SLA is nineteen, and Plonsky and Oswald (2014) state, "small sample sizes . . . are typical in our field." (p. 891). Rather than relying excessively on p-values, Plonsky and Oswald recommend considering "practical significance," which "is usually expressed as an effect size." (p. 898). We will examine significance both traditionally (using p-values) and in practical terms (using effect size) in this study.

Materials and Procedures

Overview

Students in the treatment group were educated on MCII over a six-week period. Their anxiety levels and test performance were measured prior to and following this MCII intervention. Anxiety levels were evaluated using two methods: a self-assessment and a physiological marker (saliva cortisol level). To determine connections between test anxiety levels and test performance over time, a proficiency measure (the Level Achievement Test) was also given before and after the intervention period.

MCII Intervention

This intervention was part of a broader ELC effort to evaluate the effectiveness of various instructional efforts aimed at promoting self-regulation and was therefore not an extra demand being imposed on the students.

MCII instruction was a part of normal class time and began during the second week of class and was taught in class for ten to fifteen minutes at a time, two times a week for six (6) weeks to the treatment group. In regard to the length of the intervention, past studies have used MCII from a forty-minute lesson (Velasquez-Sheehy, 2015) to six and ten weeks (Kizilcec, & Cohen 2017). The purpose of the study was to integrate MCII in a classroom setting in a timeline that suited the courses general objectives as well, thus 6 weeks was seen as an adequate amount of time for intervention for an exploratory study of this size. Students were taught about the overall concepts of MCII (making a goal/wish, envisioning the outcome, thinking about obstacles, and planning for those obstacles) and how to use MCII in achieving their academic goals. As a part of MCII instruction, students completed an assignment of making a weekly academic goal for their Speaking class. At the beginning of the week, they made their goals using MCII. Figure 1 provides an example of the responses provided by students during this weekly activity.

Figure 1

Example of Student WOOP Activity

Wish	Pass the TOEFL test with 80% or more between listening, speaking, writing and reading.
Outcome	Feel more prepare to go to college, feel confidence and proud of myself and make it worth it.
Obstacle	Distractions and being negative, don't focus on what´s important and forgot my goal.
Plan	If I get distracted then I will remember and make mini goals to approach the big ones.

Note. This table is excerpt from a participant's weekly goal using MCII. Copies of PowerPoint slides used in the presentation of MCII in the classroom are found in Appendix A.

Oral Interview Exams

Language test anxiety being the focus of the study, we created an anxiety-inducing testing situation in the form of an oral interview during which students were told their speaking abilities would be evaluated. The oral interviews were conducted for our research purposes twice in total—once before and once after MCII Instruction. Participants in both the treatment and control groups had these face-to-face interviews as part of normal coursework. The students were interviewed individually by the same interviewer for both oral exams. The objective of the oral exam was to challenge the participants linguistically in order to induce anxiety and raise cortisol levels. The participants were asked challenging questions that involved talking about a variety of topics such as education, health and politics, and so on, since talking about abstract topics such as these can be challenging for this level. Students were also asked to do things like give steps to a recipe of a local dish of their culture. Questions like this were difficult as it involves describing a process which students needed to know the terms of, thus inducing anxiety. The interviewer, the primary author of this study, had a neutral reaction to answers and did not give participants any positive affirmation like nodding, verbal agreement and smiling. Participants were also not given any help with their interview. For example, when students forgot words, the interviewer did not give them any answers. The combination of neutral demeanor without any positive affirmations from the interviewer was meant to induce stress.

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Two interns were given the task of collecting saliva samples both before and after the interviews. They were also instructed to remain neutral and not become too friendly with the participants as to not disrupt the effects of the interview.

Then-Now Reflective Self-Assessment

To gauge students' perceptions of changes in their own test anxiety over the treatment period, a questionnaire was given that combined all ten items from the Westside Test Anxiety Scale (WTAS; Driscoll, 2007) with all thirteen items from the Brief FRIEDBEN Test Anxiety Scale (B-FTAS) (von der Embse, Kilgus Segool & Putwain, 2013). The WTAS has been validated as a measure of test anxiety focusing on impairment of achievement and cognitions that can cause impairment; the B-FTAS is a shorter version of the FRIEDBEN Test Anxiety Scale (Friedman & Bendas-Jacob, 1997) that captures worry over social derogation, cognitive

obstruction resulting from worry, and physiological tenseness. Because impairment of achievement and cognition and social derogation are not captured by physiological cortisol levels, it is important to have these additional measures of test anxiety here. The complete self-assessment, taken by participants during the first week of MCII instruction and after completion of the MCII program, can be found in the Appendix A.

Then-Now or post + retrospective assessment has been favored in recent years as a means of measuring learner development over time (Brown, Dewey & Cox, 2014; Lam and Bengo, 2003; Rohs and Langone, 1997)). With this method, participants assess themselves only at the end of their study period, but they provide ratings of both their state at the time of the post-study evaluation (i.e., Now) and their state at the beginning of their learning experience (i.e., "Then"). Even though the instrument is administered in one sitting, the results are analyzed as if they involved a traditional pretest-posttest design. The evaluation is treated as a repeated measure with two scores--Then and Now. Regarding the use of post + retrospective (i.e., Then-Now) surveys, Lam and Bengo (2003) have concluded, "More than three decades of research on post + retrospective method has unequivocally supported this approach over the traditional pretest-posttest approach to measuring change" (p. 78). Similarly, Hill and Betz (2005) have noted, "If the aim is to understand how participants feel about program effectiveness and their personal growth or skill acquisition, the retrospective test provides a more direct assessment of these factors" (p. 514). Given the value of Then-Now for measuring changes over a period of instruction, the current study required participants to rate themselves at the end of the study period on the twenty-three item questionnaire both for present levels of anxiety (Now) and levels prior to the study period (Then). These ratings were made after 15 weeks of instruction and language testing--a period where they practiced using MCII to reduce their levels of test anxiety.

Saliva samples

In this study, cortisol was used as a measure for anxiety. While there are numerous methods to measure if students are feeling test anxiety, most of these methods are self-reports such as surveys and journal entries. One more objective method for measuring anxiety or stress physiologically is cortisol levels, which increase through the body as the individual is under stress. Cortisol is a hormone synthesized from cholesterol secreted by the adrenal cortex and released into blood (Bozovic, Racic, & Ivkovic, 2013). Determining cortisol levels by using blood as a biomarker has been used widely (Aardal-Eriksson, Karlberg, & Holm,1998; Fogelman & Canli, 2018; Vining, McGinley, Maksvytis & Ho, 1983). However, determining cortisol levels by blood can cause extra stress on participants because it is very invasive, causing false positives (i.e., increasing stress levels by the act of drawing blood; Aardal-Eriksson et al, 1998; Hellhammer, Wüst, & Kudielka, 2009; Vining et al., 1983). Due to these shortcomings, saliva is often used instead to measure levels of free cortisol in the body. Salivary cortisol is easily measured relatively stress-free by collecting a small saliva sample quickly from participants' mouths and separating out the cortisol. Salivary cortisol correlates well with free blood cortisol and is a reliable indicator for measuring stress/anxiety. (Kaufman, & Lamster, 2002).

For this study, whole saliva samples were collected from participants prior to and then following oral interviews. This was done to provide baseline (pre-interview) cortisol level for each individual so that changes in cortisol level over the course of the interview could be evaluated by comparing post-interview cortisol levels with pre-interview levels. There can be significant variation in cortisol levels across individuals depending on gender, time of day, diet and other variables (Aardal-Eriksson et al, 1998; Kaufman & Lamster, 2002; Vining et al., 1983). For this reason, comparison of changes from individual baselines prior to the language

interviews are more useful for evaluating differences across groups or between participants than are one-time saliva cortisol levels.

Saliva samples were gathered with SalivaBio's 2 mL cryovials and the Saliva Collection Aid (SCA; exclusively from Salimetrics, State College, PA), a collection device specifically designed to improve volume collection and increase participant compliance and validated for use with salivary analytes. Participants allowed saliva to pool in their mouths, and then, with their heads tilted forward, gently guided saliva through the SCA into a vial until the required volume (1.5-2.0 ml) was met. Immediately after collection, the samples were frozen at or below -20°C or refrigerated at 4°C for no longer than necessary (ideally less than 2 hours) before freezing at or below -20°C. Following collection of all samples, tubes were organized into cryostorage boxes and shipped to Salimetrics, LLC, State College, PA, USA for lab analysis of sample cortisol levels. Additional information on methods of collection and analysis can be found at https://salimetrics.com/collection-method/passive-drool-saliva-collection-device/.

LAT scores

The Level Achievement Test (LAT) is a single computer-based test done at the end of each semester at the ELC to assess students' mastery of items in their current level and below. LATs assess the learner's proficiency in reading, writing, listening and speaking. For the speaking section of LAT each student is given a prompt to speak about which is recorded and evaluated. Students are given preparation and speaking allotment adjusted to the difficulty of the prompt. The speaking task is similar to speaking tasks specified by ACTFL proficiency guidelines. After initial warm up questions, tasks target functions of the novice level, intermediate level, advanced level, and then superior levels. This provides opportunities for

students to express themselves at different proficiencies and they are rated according to the language they use.

To compare changes in speaking proficiency before and after MCII intervention, LAT scores of students were collected from both the MCII and the Control groups at the beginning and end of the fourteen-week academic term. Although the MCII intervention and most of the testing were carried out over six weeks, LAT data over the fourteen-week semester were included based on the assumption that the MCII intervention could influence test taking behavior long-term (i.e., students would continue using MCII and therefore benefit over the full fourteen weeks). The timeline for LAT could not be controlled by the researcher as it is carried out independently by the school involved at the beginning and end of each semester.

Statistical Analyses

Given the desire to understand the influence of MCII training on anxiety reduction, we compared stress levels for the MCII (treatment) and non-MCII (control) groups. Specifically, we examined differences between these groups in terms of changes on two measures of anxiety from pre-interview to post-interview. For the first measure using ANCOVA, a self-report of test anxiety, a simple comparison across groups of changes from pre to post interview using analysis of variance was adequate.

As for the second ANCOVA measure, however, two additional values needed to be calculated: 1) differences in cortisol levels prior to the speaking exam and after the exam; 2) changes in this difference between pre and post. Therefore, a single value for pre-testing (beginning of study) and a single value for post-testing (end of study) was generated, which was a change in cortisol level between the beginning and end of the speaking test. The pre- and post-testing values for this change were then compared across groups using analysis of variance.

Since cortisol level increases under stress vary by gender and because lower-proficiency learners experience more test anxiety, we included gender and L2 proficiency as covariates in these analyses.

For the third measure, cortisol levels were compared with anxiety self-reports for insight into self-awareness of anxiety. The measurement of cortisol in saliva provides physical evidence for the results of mental contrasting instruction. The questionnaire was used to assess the student's self-evaluation of the state of their test anxiety.

Results

In answer to the first question regarding differences in changes in test anxiety levels between the MCII and Control groups, ANOVA results for self-report scores revealed that students in the treatment group perceived significantly greater differences in their test anxiety levels over time (i.e., between the beginning and end of the semester) than did students in the control group. WTAS and the B-FTAS results were analyzed separately. For the WTAS, there was no significant main effect for time, $F (1, 20) = .032$, $p=.860$, $\eta_p^2= .002$, and no significant main effect of group, $F (1, 20) = 2.49$, $p = .052$, $\eta_p^2= .111$.. There was a significant interaction between time and group, $F (1, 20) = 13.32$, $p = .002$, $\eta_p^2= .400$. The treatment group dropped in reported anxiety levels, whereas the control group increased. For the B-FTAS, there was no significant main effect for time, $F (1, 20) = .220$, $p=.644$, $\eta_p^2= 0.011$ and no significant main effect of group, $F (1, 20) = .360$, $p = .555$, $\eta_p^2= 0.018$. There was a significant interaction between time and group, $F (1, 20) = 15.32$, $p = .001$, $\eta_p^2= .434$. Again, the treatment group dropped in reported anxiety levels, whereas the control group increased.

Regarding the physiological indicator of anxiety level, ANCOVA results for cortisol level changes during oral language testing revealed that over the study period (6 weeks) there

was no significant main effect of time, F (1, 21) = 0.90, p =. 355, η_p^2= .041. and no significant main effect of group, F (1, 21) = 1.40, p = .250, η_p^2= .063. See Table 1 for pre- and post-intervention values. There was also no significant interaction between time and group, F (1, 21) = .063, p = .804, η_p^2= .003. This indicates that the amount of change in cortisol between the start and end of an oral interview did not differ significantly over time between the control and treatment groups, and changes in this variation were minimal and not statistically significant. Using Cohen's (1988) benchmarks, the effect sizes for time and for the interaction between time and group were small, and the effect size for group alone was medium. More will be said regarding both significance and effect size in the discussion.

Table 1

Means and Standard Deviations of Changes in Control and Intervention Group Cortisol Levels during Interviews Pre and Post Intervention

	Group	Mean	Std. Deviation	N
Pre-Intervention Cortisol Change	Control	.0057	.15512	14
	Experiment	.0404	.09117	11
Post-Intervention Cortisol Change	Control	-.0389	.09272	14
	Experiment	.0094	.03586	11

To answer the second research question regarding relationships between proficiency and anxiety levels, correlations are shown in Table 2 below. The only significant correlation was between LAT scores and the average response to the question items on the B-FTAS related to cognitive obstruction. Each of these items related to some cognitive outcomes students experienced when taking a test such as thinking and performing well or being able to answer questions well.

In terms of effect size, we used the standard proposed for SLA studies by Plonsky and Oswald (2014), who "suggest that *r*s close to .25 be considered small, .40 medium, and .60 large" (p. 889). Given this standard, none of the correlations reached the level of high, and only eight reached the level of medium effect. The various self-reported anxiety scores were regularly correlated at levels indicating small to medium effects, and cortisol levels at the beginning of testing correlated with proficiency (LAT) testing to a degree indicating a medium effect size.

Table 2

Correlations between Anxiety Measures and Proficiency Scores

	Initial Cortisol Level	Change in Cortisol during Interview	Combined Anxiety Self-Report	Separate Westside Test Anxiety Scale	Separate B-FTAS	Social Aspects of B-FTAS	Cognitive Aspects of B-FTAS	Physical Aspects of B-FTAS
LAT Score (Proficiency)	0.38	-08	.37	.40	.36	.19	.48*	.22
Initial Cortisol Level	-	-0.54	.32	.34	.31	.29	.31	.38
Change in Cortisol during Interview	-0.54	-	.03	-.05	.01	.00	.01	-.01

*p<.05

A mixed ANCOVA with LAT scores pre- intervention as a covariate was conducted to assess whether there were significant differences in changes in LAT scores at the end of semester. See Table 3 for values including LAT scores before and after intervention. There were

no significant differences in changes in LAT scores over the semester between the treatment and control groups. Results indicated a significant main effect of time, F (1,27) = 6.42, p=.017, η_p^2= .192, but not of group, F (1,27) = .013, p = .911, η_p^2= .000. There was no significant interaction between time and group, F (1,27) = .230, p = .635, η_p^2= .008. This indicates that even though as a general rule, learners moved up on their LAT scores, this difference did not vary significantly between the two groups.

Table 3

Means and Standard Deviations of Experiment and Control Group LAT Scores Pre and Post Intervention

	Group	Mean	Std. Deviation	N
Pre Intervention LAT Scores	Control	4.4194	.63383	16
	Experiment	4.4715	.83698	13
POST Intervention	Control	4.9375	.92268	16
	Experiment	4.8246	1.00010	13

In short, in answer to the second research question, whether differences in LAT score (i.e., proficiency) changes existed between the MCII and Control groups over the course of their twelve-week ELC term, ANCOVA results revealed no significant differences between groups in proficiency development over time.

Discussion

This thesis was started by giving an overview of research that looked into the use of MCII in various contexts with an emphasis on educational settings. Based on the literature, it was argued that the use of MCII in educational contexts to lower test anxiety was not well studied. Hence, the use of MCII to lower test anxiety and improve academic gains was

researched in this thesis. Three main questions related to test anxiety measurement and reduction and change over time were addressed in this thesis. I will discuss answers to each of these questions in order and will then address limitations and ideas for future research.

Question 1: Is there any significant difference between the anxiety levels (as measured by self-assessment and cortisol levels) of the treatment and control groups after MCII intervention?

The analyses of the physiological data revealed no significant difference between the treatment group, which received the MCII intervention, and the control group, which did not receive MCII instruction, in terms of cortisol spikes resulting from language testing. In other words, cortisol testing suggests students who used MCII to reach their goals with if-then statements were not significantly less anxious when being tested than the control group, who did not participate in MCII. Given that the use of a physiological measure such as cortisol to evaluate the effects of MCII is novel, it is difficult to relate these results to others. MCII has regularly been studied in relation to behaviors such as mind wandering, snacking, smoking and weight-loss that are often connected with emotion, but no study has, to our knowledge, explored more direct connections to anxiety, or even affect more generally. The effect sizes might be considered small, at best, for educational or SLA studies, indicating no practical effect. Given the consistent positive outcomes for the other behaviors listed, where medium to large effect sizes and significant differences have been seen, it is surprising to not find an influence on stress levels for MCII. However, most of the previous studies have focused on changing one's behavior and not one's emotions or attitudes, so more research is needed regarding the use of MCII in these areas.

As for the self-evaluation, the treatment group reported lower levels of anxiety after MCII intervention. The control group, on the other hand, reported higher levels of anxiety, resulting in a significant interaction for time and group. This follows patterns seen in other test-anxiety-reduction studies where treatment groups were taught things such as study or relaxation techniques and then reported lower levels of anxiety than control groups following such instruction and practice of these techniques (e.g., Serok, 1991). It also follows a pattern seen in foreign language classrooms, where anxiety-reducing strategies have been associated with reductions in self-reported foreign language classroom anxiety (Alrabai, 2015). Self-reports have also shown differences between control and treatment groups in several studies designed to reduce overall anxiety in educational settings. For example, Franco et al. (2010) taught teachers mindfulness techniques and found that the group taught these techniques reported lower levels of psychological stress than those not taught. In contrast, although small differences have been found on physiological measures such as respiratory rate and heart rate between control and treatment groups during attempts to reduce anxiety in educational settings, these differences are not typically significant. One exception is the effort to reduce test anxiety by Bradley et al. (2010). They taught learners emotional self-regulation techniques involving biofeedback training (monitoring and attempting to regulate one's heart rate variability, or HRV). Those taught showed lower levels of test anxiety following the intervention, as measured both by the self-assessment and HRV measures. Bradley et al.'s (2010) study, combined with the minor but non-significant differences in physiological results in this and other studies, suggests that further research evaluating anxiety-reduction techniques (specifically test anxiety) would be wise.

Studies that have used both physiological reactions to stress and self-reported reactions as a measure did not have any significant correlations. McLeod, D. R., Hoehn-Saric, R., & Stefan,

R. L. (1986) found in patients who suffered from general anxiety disorder that physiological measures such as heart palpitations, sweating, and systolic blood pressure had no significant correlations to self-reported levels of stress. A number of other studies also did not find any significant correlations between self-reports and physiological measures (e.g., Morrow & Labrum 1978; Skelton & Pennebaker, 1982) These studies suggest that subjective ratings of anxiety can be weakly correlated with physiological measures, indicating participants' self-reports of the extent of their anxiety are measuring something distinct from their physiological response. However, in the case of the current study, students may have reported having lowered test anxiety due to their active efforts to reach goals by overcoming obstacles. Creating if-then statements makes goals more attainable; thus, doing so may be the reason for the results in self reports, as students have plans for the difficulties they encounter.

Question 2: What is the relationship between self-reported levels of anxiety and cortisol levels, an objective physiological measure of anxiety?

There was no significant correlation found in this study between self-reported levels of anxiety and cortisol measures. Students reported to significant decrease in anxiety after MCII intervention. Cortisol levels of students who had MCII intervention did not differ significantly after when compared to before. The comparison of anxiety measurement methods is an element that has not been used in previous studies implementing MCII in the classroom. Physiological measures of anxiety such as cortisol levels in saliva are very direct in measurement. Surveys, on the other hand, can capture cognitive aspects of self-reported anxiety, which may indirectly lead to some of the physiological. Cortisol levels and performance/proficiency are not significantly correlated. However, performance/proficiency is significantly and most highly correlated with

cognitive aspects of self-reported anxiety. In other words, the more a learner thinks about her performance on a test, the worse she is likely to do.

The discussion of the first question explained that changes in cortisol level after MCII treatment between two groups was not significant. Self-reports, on the other hand, indicated a significant difference in anxiety between groups, with the treatment group reporting less test anxiety after using MCII. There were no significant correlations between self-reported anxiety and cortisol levels. McLeod, Hoehn-Saric, & Stefan, (1986) also found that there wasn't a significant correlation between physiological measures and self-reports in participants. What they did find that was interesting is that although participants could not fully recognize the amount of their physiological reactions to stress, they could report the direction of their anxiety (higher or lower) when exposed to stressful situations. The current study did not find a significant difference between the group's cortisol levels before and after MCII treatment; however, students did identify the direction of their test anxiety as being lower after the treatment Furthermore, there was a medium effect size seen in the positive correlation between initial cortisol levels and self-reports of the physical aspects of test anxiety, indicating that students recognized some physical reactions to the testing situation.

Question 3: Is there a significant difference between groups on speaking test score changes (i.e., is there support for a possible indirect effect whereby anxiety levels decrease and speaking test performance therefore increases)?

The present study examined whether MCII as a method of intervention for test anxiety was effective in lowering cortisol levels as well as improving students' exam scores. Differences in changes in proficiency (LAT scores) between the MCII and Control group were also not significant for either the control or the treatment group. If we investigate the details, the control

group had slightly higher proficiency gains, but these differences were not statistically significant. Simply stated, there is little evidence that MCII created, whether directly or indirectly, differences between the groups in terms of gains on proficiency tests.

These findings may seem to contradict the prediction of this study as well as the results of previously mentioned studies that found data suggesting MCII improved the academic performance of students (Velasquez-Sheehy, S., 2015; Duckworth, Kirby, Gollwitzer, & Oettingen, 2013). However, it should be noted that the current study focused not directly on improving test performance but instead on decreasing stress levels. The emphasis of the MCII training was largely on planning to deal with the affective obstacles of test taking and not as much on taking other steps to improve one's academic performance (though students regularly focused on academic steps rather than affective matters).

One noteworthy result is that initial cortisol levels were positively correlated with proficiency (LAT) scores, indicating a medium effect size. In short, it appears that higher initial (pre-testing) cortisol levels contributed to higher test scores; those who showed greater physical arousal scored better on the LAT. Furthermore, all test anxiety self-report measures (Table 3) were positively correlated to various degrees with LAT scores. This appears to lend some support to the notion that anxiety can be facilitative when it comes to test performance (Sperling, Reeves, Gervais & Sloan, 2017) and goes against the fact that debilitative anxiety receives more attention than facilitative in SLS studies (MacIntyre, 2017).

Limitations

The lack of differences in cortisol levels may also be explained by students being exposed to the same manner of testing twice. While the study focuses on the use of MCII to lower test anxiety, the fact that students were re-exposed to the same oral interview (test) and the

same tester a second time may have had extraneous effect (students were likely more relaxed with the familiar circumstances the second time around), reducing any possible influence of MCII. The test was administered in the same manner, by the same interviewer and at the same time for each student. These factors may have resulted in students feeling more comfortable taking the specific test and circumstances, leading to the non-significant difference in cortisol levels between groups despite the significant difference in self-reported overall test taking anxiety.

Another factor to add to the insignificance of cortisol samples results may be the not so straightforward nature of cortisol itself. The role of cortisol in the body is to raise the level of energy in the body by raising glucose levels (Nelson, 2005). Therefore, it may rise due to factors that are not a negative affect such as getting up in the morning (Wilhelm et. al. 2007) or physical exercise (Hansen et. al. 2008). Adding to that, negative stimuli doesn't always result in raised cortisol levels (Bradley et. al. 2001). So, to say the exact reason for participants not having significant differences in cortisol levels in this study is a result of differences in levels of "anxiety" may need to be reexamined. One way to yield more precise results could be taking a baseline sample much before testing, an engagement sample right before testing and lastly a recovery sample much after testing. This would add one more sample compared to this study and may have more precise measurements.

A reconsideration may be the nature of the MCII implementation and student goals. Most students chose an academic goal to pursue in the implementation of MCII instead of goals directly related to test anxiety, despite being introduced to MCII in the context of test taking. Since students did not typically create if-then statements to counter test anxiety, they did not have a plan when they were stressed during testing and thus their physical response (levels of

cortisol) did not demonstrate any significant difference. Focusing on improving their grades and not lowering their test anxiety may not have affected testing anxiety in the treatment group. The fact that differences on the self-report were present does, however, suggest some possible influence.

Although sample size was the maximum possible for this exploratory project, it should be noted that larger sample sizes are more favorable in studies similar to this. A larger sample size might produce different or more representative values. Von Der Embse, Barterian, and Segool, (2013) have noted that studies in test anxiety reduction typically suffer from low sample sizes and suggested that larger numbers are necessary to generalize.

Conclusion

This study sought to answer three research questions. The first question addressed whether MCII lowered test anxiety among students. When cortisol levels in students were used as a measure of test anxiety, the treatment group did not show significant different levels of anxiety when compared to the control group. However, in the case of self-reports, participants in the treatment group reported feeling less test anxiety when compared to the control group. The second question addressed whether students who used MCII had higher performance rates in exams when compared to the control group. We found that students in the treatment group did not score significantly higher on tests compared to the control group. These findings suggest that using MCII as a method of test anxiety intervention can have perceived benefits by the participants. At the same time, students may benefit from learning MCII as a method of goal actualization through methodical goal setting using if-then statements. With the complexity of test anxiety and goal setting, what works in one environment may not work in another. Further

research on the effectiveness of MCII on a larger population in a longer time frame with another physiological measurement of anxiety would be a welcome contribution.

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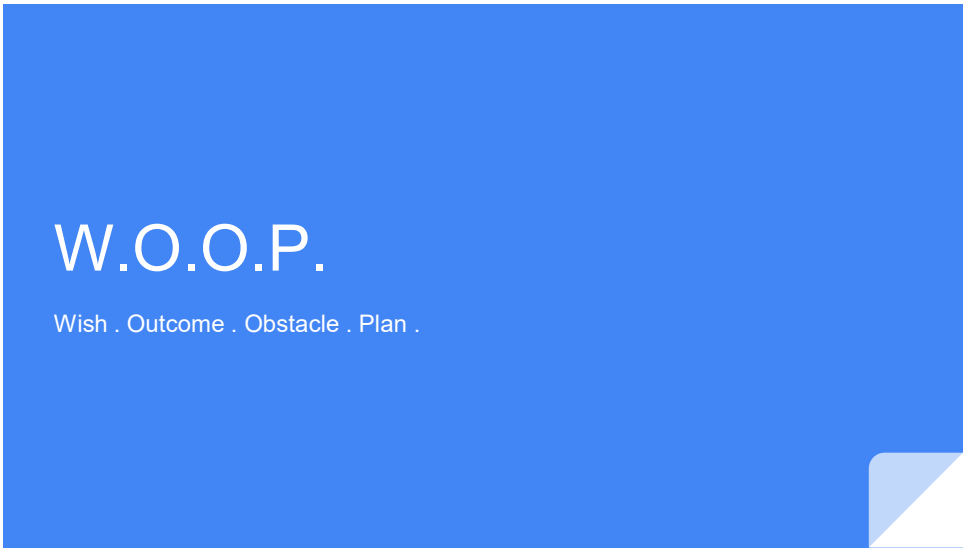
APPENDIX

Classroom PowerPoint Example



Student Activity Worksheet

Using WOOP	
Week #:	
Wish -	
Outcome -	
Obstacle -	
Plan -	
Reflection on use of WOOP this week:	