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# Student Examination Performance Predictors: The Cramming Study Strategy and Examination Format

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Student Examination Performance Predictors: The *Cramming Study Strategy*

and Examination Format

By

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Student Examination Performance Predictors: The *Cramming Study Strategy* and Examination Format

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This alternate plan paper has been examined and approved by the following members of the alternate plan paper committee.

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Abstract

Examinations that consist of varied formats are distributed to students across educational institutions to measure individual performance and achievement. Previous research studies that investigated the effects of cramming and the usage of different exam formats were examined and summarized in a comprehensive literature review. Findings suggest that students commonly use the cramming study strategy as a method of preparation for exams. Yet the effectiveness of cramming remains a subject of controversy among educators. Little to no research has been conducted to determine whether cramming is engaged in response to a given exam format. This author concludes from a review of the literature that there may be a correlation between cramming engagement and examination format. There is no evidence to corroborate this hypothesis, but implications for further research are suggested.

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CHAPTER 1

INTRODUCTION

Throughout the history of education, educators have generated a wide range of exam formats to measure students' academic performance. However, the best methods of construction and the administration of these exams remain controversial. This has caused examination systems to significantly change over time as a result of this.

Single assessments were not employed until the nineteenth-century when instructors used recitation to evaluate mastered material. The recitation testing method was incorporated into many classrooms and students were required to orally reiterate information in a group setting. Performance was arbitrated by instructors based on the degree of the mastery of the material. Yet, many instructors questioned the subjective nature of the grading process. Responses were not quantifiable even when identical questions were presented to each student. Additionally, instructors' pedagogies varied and curriculum content was often defined inconsistently across them. This remained an issue throughout the nineteenth century until the standards movement was introduced in the 1930s (Stiggins, 1991). The movement set the foundation for objective grading through standardized testing, measuring academic achievement (Giordano, 2005).

A universal method of testing for admission into universities was not introduced until the 1940s (Stiggins, 1991). Restrictive admission standards were utilized when university administrators and educators agreed that admittance to specific courses and programs should only be accessible to students after academic capability has been acknowledged. Standardized assessment enabled public-school educators to address curricular concerns, and provide the preparation students needed to meet college admission requirements (Giordano, 2005).

Although support for standardized assessment had proliferated by the 1950s (Stiggins, 1991), the nature of the testing remained controversial throughout the 1960s and 1970s. Diagnostic, low-stakes, norm-referenced tests were the most commonly administered tests up through the beginning of the 1960s (Koretz, 2008), when politicized attacks and contentious arguments advocated that tests in general were essentially flawed (Giordano, 2005). By the 1970s, minimum-competency testing programs were designed. Many states mandated statewide testing programs and schools were held accountable for students' test performance as interest in test-based accountability arose (Koretz). More than seventy-three laws were legislated by policy makers between 1963 and 1974, and responsibility for student achievement fell to educators (Rothman, 1995).

Educational systems underwent vast changes during the 1980s. During that time, state agencies became authorized to manage districts and schools that failed to demonstrate strong test scores. Some states offered financial payment as an incentive for schools that could establish high test scores. Additionally, national and international assessment usage increased (Stiggins, 1991), and tests were restructured to supplement multiple-choice formats. The tests became known as "performance assessments" or "authentic assessments". They incorporated a multitude of tasks and additional test forms, and were constructed to include essay and short answer responses, hands-on performance, and portfolio assessments. Authentic assessment was offered as a new tool, but the idea of performance assessment usage in schools was introduced fifty years earlier. During that time, arguments to incorporate performance assessment into classrooms were both supportive and unsupportive, which resulted in infrequent usage and limited interest. Usage of performance assessments increased in popularity after educators

established that instruction should increase instructor authenticity and students' communication, problem-solving, and reasoning skills (Koretz, 2008).

During the 1990s, efforts were made to include English as a foreign language learner (ELL) students, and students with disabilities in state-mandated standards-referenced testing or high-stakes testing. The tests were designed to meet individual state standards, and increase sensitivity and clarity for educational goal improvement by holding educators accountable for student improvement. Accountability is measured by comparing student outcomes, which are based on test scores. Student scores are separated by grade level and then compared with previous student scores from the same grade level (Koretz, 2008). This method of testing is now mandatory and has been required in American schools since the 2001 *No Child Left Behind Act* was signed. The act infers that the differences between measured student outcomes can distinguish the quality of schooling provided by individual schools (Wiliam, 2010).

<div align="center">Statement of the Problem</div>

Today, college instructors measure students' obtained knowledge and competencies through multiple assignments and presentations, yet course grades are heavily weighted by examination scores. Students are pressured to perform well under these conditions in order to graduate. Studying is employed in response to this to achieve high examination scores.

Exam formats and student study strategies are widely varied. Yet, researchers have not determined whether specific study strategies are engaged in response to a given exam format. Therefore, this alternate plan paper will focus primarily on previous research studies that have concentrated on exam formats, and usage of the cramming study strategy amongst college-aged populations. Examination format, student examination populations and preferences, examination performance influences, study strategy approaches and influences, and the cramming study

strategy will be explained throughout the comprehensive literature review.  The review

concludes with a summary of the existing research followed by future research

recommendations.

CHAPTER II

REVIEW OF THE LITERATURE

Student Examination Performance Predictors: The *Cramming Study Strategy*

and Examination Format

**Examination Format**

Research has specified every assessment method should be fair, reliable, and valid; three essential qualities that must be represented in exams (Memon, Jough, & Memon, 2010). Examinations administered throughout colleges and universities consist of various assessment formats. These formats can range from an oral format which involves a student answering a question verbally; a written format, which commonly includes multiple-choice; matching; true/false; short answer; essay questions which require open-ended responses to test questions; or a computer format where examinations are completed online. Each examination format has both advantages and disadvantages.

**Oral**. Oral examination evaluation promotes discussion and follow-up questions requiring the utilization of analysis, synthesis, and evaluation. Oral formats are flexible and adaptable. Presented material often is reduced and allows students to focus on studying and building communication skills. Instead of memorizing large sections of course material, students study the meanings of the course content. Oral responses to administered questions help determine the amount of information and the level of understanding individual students have obtained from their courses (Asklund & Bendix, 2003). At that point, performance-related feedback can be delivered to students more readily by instructors. Additionally, teaching methodology flaws are more easily discovered by instructors observing oral examinations (Roecker, 2007). Although there are acknowledged advantages, oral examinations are not

without drawbacks.  One disadvantage is potential bias (Asklund & Bendix).  Unless pre-determined sets of specific answers are produced prior to the examination, the evaluator may or may not grade appropriately.  Other disadvantages include increased time consumption, and potential threats to reliability (Davis & Karunathilake, 2005) and validity (Memon, Joughin, & Memon, 2008).

**Group oral**.  Group oral examinations involve a group interaction where each individual is assessed and observed by the test rater.  Several suggested advantages of the method include increased collaboration, multiple examinees are scored at the same time, and students report the method to be less daunting than one-on-one interaction with the examiner.  Although numerous advantages have been acknowledged, the validity of group oral testing can be questioned.  This was revealed when Hilsdon (1991) conducted a language analysis.  Two group tests were transcribed to determine which of the six categories of functions presented within the curriculum were produced.  Unfortunately, results showed that only the impartial and seeking factual information category was elicited on the tests (Van Moere, 2006).

**Written.**  Written examinations often are viewed as the more traditional format.  These are commonly preferred for the ease of administration to large populations of students.  College exams frequently is comprised of multiple-choice and/or essay question types.  The same items are administered at the same time to every student, allowing a broad spectrum of course content to be covered (Rushton & Eggett, 2003).  To answer multiple-choice questions students are required to read the questions and understand and interpret the distinctions between potential response choices.  To formulate responses to essay questions students must comprehend and distinguish portions of each question (Tait, 2010).  An added advantage is the increased possibility of accurate responses to exam questions.  This may be witnessed from students who

display high levels of test anxiety during testing situations (Asklund & Bendix, 2003).

Theoretically, written exams provide more privacy, and interactions between the student and the

teacher are not implied (Gharibyan, 2005).  Criticisms of written examinations are minimal.

They include recall and recognition reliance, and penalization for poor grammar, reading and

writing skills (Rushton & Eggett, 2003).

**Student Examination Populations & Preference**

The administration of oral examinations is not a common practice amongst most college

professors.  This has been addressed in numerous studies.  Often, undergraduate students are

required to present specific topic material orally to their classroom peers, yet they are not tested

on their retained knowledge of classroom and other coursework materials.  More often than not,

university students are required to complete written examinations, despite progressive changes in

college atmospheres, populations, and settings.

Oral exams are administered to various groups of students, yet research that has

investigated oral verses written exam performance is cited less often.  One cause of this may be

that oral examinations are administered more frequently to specific populations of students,

rather than to all students.  Often, they are required for elementary and secondary education

students with disabilities, ELL, or university students majoring in health-related fields.  When

populations are overly represented and students cannot be encompassed as a whole group, it is

difficult to generalize exam performance outcomes across most students.

**Children with disabilities.**  Empirical research emphasizing examination format in

relation to the testing performance of disabled students is limited.  Students with learning

disabilities (LD) or visual impairments are often provided with testing accommodations.  A

commonly applied accommodation used to decrease administration time allows for a teacher to

administer an examination orally by using an audiotape, a computer using amalgamated speech or a human voice (Erin, Hong, Schoch, & Kuo, 2006). Although students with disabilities can benefit, the validity and psychometric concerns with testing program inclusion and accommodation remains controversial (Weston, 2003).

Weston (2003) compared the performance of 65 fourth-grade students with LD and 54 fourth-grade students without LD when an oral accommodation condition was introduced for a mathematics test that used items constructed from the National Assessment of Educational Progress (NAEP). Although students with and without disabilities showed improvement under the accommodation, teachers who participated in the study reported that general education students disapproved the slower-paced oral testing accommodation (Weston).

Erin, Hong, Schoch, and Kuo (2006) investigated the differences in tests scores, speed and oral versus written test administration in students who were classified into blind, low vision, and sighted groups. Each group was comprised of 9 eighth grade students who were administered 6 different tests. Testing preference results indicated a greater number of students in each group preferred braille or print to an orally administered examination. Multiple-choice and short-answer questions were administered in both oral and written conditions. The written mediums included print and braille (only used for the blind group) and the oral medium was auditory. Results indicated each group had better performance on the multiple-choice questions in both conditions. In comparison to the other groups, the blind group yielded higher multiple-choice question scores on the written medium condition. The blind group also preferred braille to an orally administered examination. However, they needed more time to complete the questions than the low vision and sighted groups who also preferred a written medium (Erin et al., 2006).

**College and university.**  Most students have a preferred testing format regardless of population or location, and when the preferred format is administered, anxiety may be reduced (Choi, 1998).  Ben-Chaim (as cited in Birenbaum, 2007) reported examinations that require less time consumption and minimal memorization are what students prefer in terms of format. Findings also suggested that students prefer untimed exams because time limitations add additional stress and worry.  Objective exams are also preferred over subjective exams (Choi, 1998) and additional studies have shown student assessment preference to correlate with learning approaches.  One study demonstrated that university undergraduate students who engage in deep learning tend to favor essay questions, which allow students to generate their own responses to the given question.  Students who engage in surface learning tend to prefer multiple-choice questions, where they can select their response from a list of optional answers (Birenbaum & Feldman, 1998).  In addition, researchers have indicated that male students prefer and receive higher scores on multiple choice questions, and female students prefer and receive higher scores on essay exams with open ended questions (van de Watering, Gijbels, Dochy, & van der Rijt, 2008).

In 2008, van de Watering, Gijbels, Dochy, and van der Rijt developed a study to determine student assessment preferences and perceptions when multiple examination formats were given in New Learning Environments (NLE).  NLEs are designed to improve higher education assessment settings.  A total of 765 students' assessment preferences were measured using a pre-test and students' perceptions were measured using a post-test.  Both tests were adaptations of the Assessment Preferences Inventory (API); a Likert-scale survey intended to measure seven assessment proportions.  The adjustments were made so the learning and assessment environment could be implemented into the questionnaire.  Students were also given

opened ended and multiple choice questions, which were used to measure recall, concept and principal comprehension, and the application of knowledge used when new situations are presented.  A total of 83 students were given all 3 situations (van de Watering et al., 2008).

According to the findings, students who preferred taking traditional written assessments (multiple-choice and essay questions) had lower performance scores.  Assessment scores and preferences were found to have a limited relationship.  Results of assessment types and item format indicated that written tests, especially those with multiple-choice questions and take-home exams were preferred over oral tests, computer tests and portfolios.  It is implied that students preferred tests that allowed usage of class materials (books, notes, papers, etc.).  Students were also asked to provide their preferences in terms of cognitive processes.  In order, student preferences included: applying, comprehending, critical thinking, drawing conclusions, explaining and problem solving.  Non-preferred preferences included: comparison and examples of differing conceptions, evaluations of solutions or opinions given by others, and scientific investigation.  No significant relationship was found between student preferences and assessment perceptions.  A comparison of cognitive processing preferences and actual outcomes of measured cognitive levels was found to have no significant difference (van de Watering, et al., 2008).

Undergraduate students majoring in health-related fields are often required to complete written examinations, while graduate students in these fields are often required to complete both oral and written examinations.  Few studies have compared the significance of oral examinations amongst these student populations.  Rushton and Eggett (2003) investigated the benefits and drawbacks of oral examinations with a group of 389 undergraduate nursing students.  The participants were divided into five groups that included only oral examinations, objective written

examinations, or combinations of the two. When applied in clinical situations, oral examinations were found to be an effective method of evaluation for testing medical and surgical content knowledge and critical thinking. Students in Group 3 who completed only the oral examination achieved higher scores than the other groups. Student evaluation feedback reported primarily negative concerns regarding the written examination and positive comments regarding the oral examination. Although the students were provided an in-class review and faculty were available to answer any questions, all students presented concerns about the oral examination situation. Despite this, every student who took the oral examination reported they thought the oral examination was advantageous. The researchers also witnessed that students who completed the oral examination studied more effectively because they studied both individually and with other group members (Rushton & Eggett, 2003).

**English as a foreign language.** The most appropriate examination format for students with diverse cultural and linguistic backgrounds remains controversial. Generally, differences in writing ability and language proficiency are noted amongst these students. Exams with multiple-choice questions control for these dissimilarities and thus appear to be the favored consensus amongst researchers (Tait, 2010).

English as a Second Language (EFL) refers to students learning to speak English who reside in their home country. Tait (2010) examined the approaches and perceptions to multiple-choice and essay examination formats of 93 native Chinese students who attended western universities. Findings showed that examination format did not directly affect approaches to learning. However, students commonly reported using deep learning approaches, especially in preparation for essay exams. The opportunities for feedback regarding the processing of the required tasks were insufficient on multiple-choice exams. This was associated with poorer deep

level processing strategies.  Additionally, students with poorer grades prepared for exams using memorization and surface learning strategies (Tait).

Scott (1986) assessed 160 native Brazilian adult students' affective reactions to administered pair and group oral EFL test formats.  There was no significant difference found between student reactions and oral language test formats.  A qualitative analysis revealed many students reported increased anxiety before and after the oral test formats on the affect questionnaire.  Students also reported that both oral formats produced a negative impact on their emotive state.  As indicated, written tests were preferred by a majority of students because there would not be time constraint, allowing for more consideration before responding (Scott, 1986).

**Examination Performance Influences**

**Biological, physiological, & psychological changes**.  Academic examinations are naturalistic stressors.  Stressors influence biological functioning and exam performance. Physiological processes that are affected differ as a function of psychosocial causes, sensitivity to stress, and time of day or year (Lacey et al., 2000).  These effects can be observed during situations that provoke stress.  Common physiological alterations are cardiovascular (e.g. heart rate period, vagal tone), neuroendocrine (e.g., ACTH, cortisol, prolactin) and immune (e.g. immune globulin A, sIgA, lymphocyte proliferation).  Evidence has suggested that anticipatory responses to examination cause accelerated cardiac activity both before and during exams.  The pituitary-adrenal system is affected by the negative emotions and ambiguity that stressful situations can incite.  This is seen prior to examinations when cortisol is increased after adrenocortical activity is affected in response to anticipatory responses (Spangler, 1997). Research has also indicated that the functioning of the immune system is impacted by stress and neurovegetative changes including altered sleep and food intake (Lacey et al., 2000).

Corresponding with these fluctuations, short-term and long-term effects are then activated from endocrine or sympathetic systems, and pathways (Spangler, 1997).

Spangler (1997) found that the physiological and psychological response patterns of 23 psychology students varied when the examination condition was compared to the control condition. Physiological response measurements were recorded during the memory examination and served as the controlled condition. The physiological responses recorded during the oral examination served as the examination condition. Cortisol and sIgA values were analyzed 15 min before the exam and 5 and 15 min after exam from saliva samples. STAI-G ratings of pre-situation and post-situation anxiety scores, and change scores within each experimental situation were calculated. Ego-resiliency, ego-overcontrol and ego-undercontrol student personality traits were calculated from the California Adult Q-sort personality assessment. Pre-examination results demonstrated increased anxiety. Higher anticipatory stimulation physiological within-situation responses were exhibited pre-exam in comparison to the pre-control situation and reduced response recovery physiological within-situation responses were exhibited post-exam. Students exhibited higher anxiety and stress levels during the exam situation. Emotional response did not relate to ego-control, but measures of anxiety and cardiac activity related to ego-resiliency. Shortly following each situation, highly resilient students were able to down-regulate their emotions and lower their anxiety. They exhibited suitable stress response to the pre-control and suitable recovery to the post-control situation. In comparison to lower resilient students, results indicated the higher resilient students adapted better to emotional and physiological arousal regardless of context. Lastly, the students with higher ego-control demonstrated lower physiological reactivity under both situations (Spangler, 1997).

Lacey et al. (2000) investigated the physiological and behavioral responses of 18 Carleton University graduate students and 18 control subjects (age and sex-matched university students and non-students) that occurred from stress caused by an oral academic examination related to their dissertation or full defense. Results indicated that raised cortisol levels were more prevalent among female graduate students than male graduate students 1 hour before the oral examination. However, this was not the case 6 to 8 weeks earlier after students had submitted their written documents. Although feelings of mastery and professed stress were the same among graduate students and controls, malaise (e.g., headaches, lethargy) was experienced more often by graduate students. Findings suggested that cortisol is released in response to immediate threats, and immune changes occur more often in response to distal events (Lacey et al., 2000).

**Examiner.** Although there has been limited research regarding the relations between an examiner's behaviors exhibited during the administration of an oral examination and the impact it has on student performance, it has proposed that student test taking abilities may be influenced.

Plough and Bogart (2008) conducted research which involved videotaping interviews, a one on one, role-play task and an oral performance examination to study the verbal discourse (i.e., back channel cues), nonverbal (i.e., eye contact & body posture), and paralinguistic (i.e. voice, volume & speed) behaviors of an examiner. An examiner, an examiner/researcher, a researcher, and four perspective graduate student instructors (GSIs) participated by taking the Graduate Student Instructor Oral English Test. The test included four tasks, which were constructed to introduce situations which would require GSI and student interactions. The GSI's were referred to as candidates within the study. The tasks included a Background Interview, Lesson Presentation, Office Hour Role Play, and Ten Video Questions. Examiner 1 played

"Steve" in the role-play situation. He posed as an undergraduate student in a GSI's office during office hours. The Office Hour Role Play was reviewed by each GSI, who then evaluated and provided feedback on their language performance, the role-play topic content and its likelihood of occurrence in real situations, and the realism of discourse behaviors presented by the examiner (Plough & Bogart, 2008).

Results indicated that Steve's behaviors were conveyed as those of an undergraduate student. Candidates observed a lack of eye contact and minimal body movements or position adjustments. A consistent raise in Steve's intonation was noted at the endings of his statements. The researchers proposed that uncertainty can be indicated or an approval or confirmation may be sought when intonation rises at the end of a student's statement. Communicative functions and pitch modulation were not heavily noted and early back channels were not witnessed (Plough & Bogart, 2008).

**Time spent studying.** Studies have suggested that amount of time spent studying is associated with exam scores. Using a least squares equation and a simultaneous equation system, Schmidt (1983) calculated data gathered from 216 University of Wisconsin-Madison undergraduates to determine if hours spent studying affected percentage scores on a multiple choice final exam. Results showed there was a positive correlation between exam scores and time spent studying, and time spent in discussion sections and lectures (Schmidt).

**Study Strategy Approaches**

Differences in study strategy approaches can be observed from students who prepare for examinations. Meneghetti, De Beni, and Cornoldi (2007) described the term studying as, "a group of systematic procedures or activities applied during learning that support students' active

manipulation of test content and other material." Other material can include figures or tables (Meneghetti et al., 2007).

Brown, Bransford, Ferrara and Campione (1983; as cited in Thomas & Rohwer, Jr., 1986) describe several characteristics of studying including effortfulness, isolated and individual, "cold" content and competencies with emphasized efficiency and "hot" emotional significance, context dependent, and ill-defined. Studying is effortful because self-investigation is often required. High levels of effort are required while studying in situations where alternate, more appealing activities may be present. Studying is an activity that is most often practiced individually and in isolation outside of classroom and social settings. Students are required to instruct their own study sessions and encode the material they believe to be the most relevant. Studying implicates "cold" competencies and content with accentuated efficiency and "hot" emotional importance based on anticipated success and efficacy. Bodies of information must be mastered and volition must be executed by the individual. Studying is also dependent on context; meaning, occurrence and successfulness of studying approaches and methods vary across different task situations. Studying is also ambiguously defined. High school and higher education instructors provide students with limited or no information regarding test content and studying criteria (Thomas & Rohwer, Jr., 1986). Students are required to identify pertinent information and obtain studying methodology independently.

Study strategies are most successful when combinations of factors are identified including the nature of the task; the nature of the materials; the affective and cognitive characteristics of an individual when tasks are performed; and levels of motivation (Yip, 2007).

A *cognitive strategy* is described as a learning approach. The learning approach encompasses deep learning, surface learning, and a strategic approach. A deep learning

approach is characterized by a commitment to understand the taught material (Ferla, Valcke, & Schuyten, 2007).  Deep learning is an intrinsic approach that involves finding and substantiating relationships between ideas and interests (Tsai & Kuo, 2008).  When a deep approach is used, the studied material is analyzed and reinterpreted to understand and obtain the information.  The learned information can then be used in other contexts (Moneta, Spada, & Rost, 2007).  Studies have shown that students who anticipate essay exams tend to use deep cognitive processing strategies.  Often, their performance on both essay and multiple-choice exams is greater than students who only expect multiple-choice exams (Ross, Green, Salisbury-Glennon, & Tollefson, 2006).  A surface learning approach primarily focuses on rote memorization, recall, and repetition activities (Ferla et al., 2007).  Facts and details are focused on and absorbed rather than the understanding of essential ideas and models (Tait, 2010).  Extrinsic motivation is environmentally linked to the surface learning approach (Tsai & Kuo).  A strategic approach is utilized when students choose to engage in either comprehension or operation learning depending on the context (Moneta et al., 2007).

*Metacognition strategies* are described as regulation strategies.  These strategies include self-regulated, externally regulated and regulation absence.  Deep learning is self-regulated.  Often, these are engaged by students themselves.  Surface learning is externally regulated.  This is when students allow teachers and books to control their learning methods.  Regulation absence or a lack of self-regulation occurs when learning processes cannot be regulated by students themselves, and the support they receive from external sources is inadequate (Ferla et al., 2007).

Bacon and Stewart (2006) conducted a longitudinal study where 374 participants' retention of knowledge obtained from a course was studied from 8 to 101 weeks after completion of that course.  Research focused on deep learning, project-related learning, and repeated testing.

Courses used to obtain data included a consumer behavior course and a marketing capstone course. Participants' results showed more knowledge was retained when it was gained through a deeper level of learning versus surface level learning. Evidence also demonstrated that within 2 years of course completion, a majority of the obtained knowledge from that course is forgotten. In addition, retention was more likely to be found when courses tested the knowledge more than one time (Bacon & Stewart).

**Study Strategy Influences**

    **Achievement & attainment goals.** Elliot, McGregor, and Gable (1999) suggested college students' achievement goals are predictors of the cognitive/metacognitive study strategies they practice. The researchers also suggested that study strategies mediate the connection between achievement goals and exam performance. Achievement goals were structured to include approach and avoidance methods of directives, and three defined independent goals including mastery goals, performance-approach goals, and performance avoidance goals. Mastery goals were emphasized as expansions of competence and task mastery. Performance-approach goals were emphasized as extrinsic achievements of competency in comparison to others. Performance-avoidance goals emphasized incompetence avoidance in comparison to others. Deep processing, disorganization, and surface processing served as the individual variables to the cognitive/metacognitive realm. Disorganization was described as "the learner's difficulty in establishing or maintaining a structured, organized approach to studying (Elliot, McGregor, & Gable, 1999)".

    Relative to exam performance, results generated no relation to mastery goals, a positive relation to performance-approach goals, and a negative relation to performance-avoidance goals. Positive relationships were found between mastery goals and zero-order level to deep processing,

and performance-avoidance goals to surface processing and disorganization. No relationships were found between mastery goals to surface processing and disorganization, performance-avoidance goals to deep processing, performance-approach goals to study strategies, and surface processing to exam performance at zero-order level. A negative relation was found at zero-order level to disorganization. The performance-avoidance goal and exam performance relationship was found to be mediated by disorganization, while the relationship between the performance-approach goal and exam performance was found to be mediated by effort and persistence. Overall findings demonstrated the significance of separating performance goals into approach and avoidance regulation types (Elliot et al., 1999).

**Cognitive state.** Student self-efficacy and cognitive beliefs can affect effort, strategy usage, and the amount of time engaged during studying (Thomas & Rohwer, Jr., 1986). Findings also suggest mood states can contribute to the successfulness of examination performance. Negative moods can negatively alter self-efficacy levels and pre-determined goals before an examination, while positive states can increase examination performance (Thelwell, Lane, & Weston, 2007). Students who exhibit anxiety and fear in response to assessment often lack the confidence to control assessment challenges. As a result, they tend to use a surface approach when studying (Moneta et al., 2007).

Thelwell, Lane, and Weston (2007) suggested examination performance could be predicted by pre-examination cognitive states that were predicted by mood states. The researchers used the Brunel Mood Scale-32 (BRUMS-32) to measure the mood of fifty-seven college students and compared the results to determine if any relationships existed between oral and written examination performance, mood, and performance goals. The BRUMS-32 is comprised of subscales including anger, calmness, confusion, depression, fatigue, happiness,

tension and vigor.  Using a 9-point scale, students also indicated their level of confidence to achieve their goal percentage grade on the examination.  Structural equation modeling (SEM) was used to analyze the strength and direction of potential relationships between mood states, self-efficacy and self-set goals variables as predictors of oral and written examination performance within a correlation matrix.  No correlations were found in performance between the examination conditions and repeated measures MANOVA results produced no multivariate effects between mood variables by examination condition.  SEM results indicated the variables predicted examination performance at 20% for the oral condition and 7% for the written condition.  Self-efficacy was associated with feelings of calmness and happiness toward oral examination performance.  The students who indicated these feelings had lower depression, fatigue and tension levels and set higher performance goals for the oral exam.  Self-efficacy was associated with increased levels of calmness and low levels of confusion, depression and tensions toward written examination performance.  Students with increased confusion and tension levels produced poorer performance results on the written exam (Thelwell et al., 2007).

**Contextual factors.**  Contextual factors have also been found to be associated with study strategy approaches.  These include students' expectancies and standards regarding a topic, perceptions regarding professors' teaching approaches and settings, and views about academic value (Moneta et al., 2007).

To obtain data about student perceptions of learning methods and teaching approaches, Campbell, et al. (2001) surveyed and interviewed 490 students and their teachers in 24 secondary education classes.  Findings revealed that students who engaged in either deep learning or surface learning tended to concentrate on student-centered features of their class when the teachers were supportive and encouraged active participation.  However, students who engaged

in surface learning concentrated on repetition and reproduction on specific content information when the teachers implemented traditional teaching methods and learning strategies (Campbell et al., 2001).

**Coping strategies.** Lazarus and Folkman (as cited in Moneta et al., 2007) describe coping strategies as an individual's application of behavioral efforts, cognitive efforts, and strategies used when negative or difficult events are expected to occur (Moneta et al., 2007).

Moneta et al. (2007) used the Revised COPE (R-COPE) inventory to investigate approaches to studying and their relationship to coping. The R-COPE inventory contains five coping strategies to measure individual response propensities to stressors. These include accommodation (a positive method of reinterpretation when a solution cannot be established in result to a problem), approach (problem solving actions are engaged toward the stressor), avoidance (person is directed away the problem, including detachment and blame of others), self-help (conservation of emotional welfare under pressure, including the search, understanding, and expression of emotions), and self-punishment (produces negative attitudes, self-blame, and self-rumination). Two weeks prior to final examinations a group of 135 London university undergraduate students were given the Approaches and Study Skills Inventory for Students (ASSIST), the Evaluation Anxiety Scale (EVAN), the General Self-Efficacy Scale (GSES), and the R-COPE. Findings revealed the following coping predictions to studying: effective cognitive processes, both deep and strategic approaches are predicted from approach and self-help coping, and ineffective cognitive processes or a surface approach was predicted from avoidance coping whereas self-punishment was not. Male students produced a stronger relationship between evaluation anxiety and a surface approach relative to female students. Results suggested

approach or self-help coping styles were the best strategies to utilize in preparation for final examinations (Moneta et al., 2007).

**Epistemological beliefs.** According to Schommer-Aikins and Easter (2008), academic performance and study strategies are controlled by epistemically related beliefs. More specifically, comprehension, metacomprehension and an understanding of information can be predicted. To test this hypothesis the belief systems from three different cultural groups were compared by participant responses to open-ended and creative academic tasks over a period of four weeks. Participants included 264 first-generation Asian Americans (FIRSTAA), beyond-first-generation Asian Americans (BEYONDAA), and European American (EUROA) juniors and seniors. Each student was enrolled in a business communication course located at a West Coast University located within the United States (Schommer-Aikins & Easter, 2008).

Various instruments were used to measure the differences between groups. The Learning and Study Strategies Inventory (LASSI) has been a commonly used assessment to measure study strategies, which are linked to motivation, self-regulation and technique. The Attitude Toward Thinking and Learning Survey (ATTLS) was administered to measure epistemically related beliefs. To measure academic performance in the areas of comprehension (i.e. phrase, sentence and paragraph comprehension) and word decoding, a Reading Comprehension test was administered. This assessment was used from the NCS Pearson Reading and Arithmetic Indexes-12 (Schommer-Aikins & Easter, 2008).

Results indicated that multiple contributors determine cultural differences in the study strategies applied between each group in terms of epistemological beliefs, gender, and ways of knowing. The EUROA group was more proficient in the selection of main ideas; they had increased control over their anxiety about school and increased test provision in comparison to

the FIRSTAA group.  Results from the EUROA group were also better in terms of main idea

selection, the usage of information processing strategies, and increased academic motivation in

comparison to the BEYONAA group.  Comparisons between the FIRSTAA and the

BEYONDAA group showed no significant differences in these areas.  Epistemological belief

differences about accrued periods of time for learning and knowledge organization were

measured using Speed and Structure scores. The scores were significantly higher among the

EUROA group and no differences were found between the FIRSTAA and BEYONDAA groups.

The results indicated that Euro-American students perceived the learning process to be slow and

ongoing.  These beliefs were stronger in comparison with the Asian-American students.

Differences were found in the gender comparisons.  Time management, study aid usage, and

school attitude was found to be more proficient amongst women, while men had more control

over anxiety (Schommer-Aikins & Easter, 2008).

Study strategies can be influenced by cultural perspectives on learning.  In Taiwan,

students frequently attend one of the over 5,000 "cram schools."  Cram schools are private

schools that provide after school instruction to increase knowledge and academic performance.

The primary purpose of cram schools is to prepare students for the high school entrance

examination.  For a short period of time, students attend these schools to enhance their

examination performance and achievement scores (Tsai & Kuo, 2008).

Tasi and Kuo (2008) interviewed 45 students from 3 separate cram schools in Taiwan to

research student perceptions about learning and learning science.  A majority of students

responded with a quantitative view about learning and learning science.  Common responses

upheld views of "memorizing", "preparing for tests", and "calculating and practicing tutorial

problems" as their conceptions about learning.  The researchers noted the expressed notions of

learning and indicated surface learning was factored by external influences for these students (Tsai & Kuo).

**External factors.** Course characteristics are considered to be external factors that influence the studying methods students use. Performance criteria, in-class, and out-of-class factors represent segments of course characteristics which make up an autonomous learning model. When student perceptions mediate performance criteria, the choice and types of study activities students select and the success of those activities following performance exams can be determined. As a result, learned course material, student achievement, and instructor conclusions about what information students have learned is influenced. In-class factors include grading procedures, lecture features, provision of review and educational support, and knowledge students have about the criterion features and what is entailed. Out-of-class features include readings and characteristics of out-of-class assignments (i.e., projects and study activities) (Thomas & Rohwer, Jr., 1986).

**Individual differences.** Individual differences play a key role in the determination of study strategy approaches. Researchers have described individual differences as: levels of anxiety produced from evaluative situations, motivation and self-efficacy beliefs, previous success and failure rates, participation within academic and learning settings, total time spent studying (Moneta et al., 2007), and shyness as a personality trait or disposition (Crozier & Hostettler, 2003).

Nicholls (1984); and Nicholls, Patashnick, and Nolan (1985) suggested educational learning is affected by motivational orientations that include work avoidance, and task and ego orientation. Students displaying work avoidance tendencies apply little effort and strive to minimize any repercussions with that. Task oriented students seek to gain knowledge and

understanding because they want to learn.  Students with ego orientations want to outperform others and demonstrate they have higher abilities (Nicholls, Patashnick, & Nolan, 1985).

Nolen (1988) found that task orientation can pre-determine unplanned strategy usage and individual difference play an important role in motivational orientation.  To compare individual differences and study strategy practices, 62 eighth-grade students were required to study expository passages for twenty min. then explain what they had read to another individual. Students were then instructed to complete the Task-Specific Strategy Use, Task-Specific Strategy Value, and the Task-Specific Motivational scale. Results showed that surface-level processing strategy practice and usage was positively related to ego orientation.  It was further shown that task orientation was found to be more positively related to deep-processing strategies than to surface-level strategies (Nolen, 1988).

**Procrastination.**  College students frequently engage in academic procrastination when studying for examinations and report task aversion and fear of low performance as reasons for this.  Procrastination is described as knowingly delaying tasks scheduled for completion and lacking the motivation needed to finish those within the given time frame.  It has been suggested that procrastination factors are situational or can occur as a personality trait, which is characterized by an individual's predisposition to engage in negligent behavior (Senécal, Lavoie, & Koestner, 1997).  Steel (as cited in Romano, Wallace, Helmick, Carey, & Adkins, 2005) concluded that procrastination is predicted by automaticity, energy regulation, goal attention, temptation attention control, and propinquity to impulsivity and temptation.  Research has found that students who procrastinate often score higher on anxiety and depression measures and lower on self-esteem measures in comparison to students who do not procrastinate (Senécal et al., 1997).

Senécal et al. (1997) examined evaluation expectation and frame of reference to determine their impact on procrastination. The researchers administered an academic procrastination scale to fifty-eight female undergraduate students and randomly assigned them to a 2 x 2 factorial design condition. Four tasks with varying difficulty and interest levels were administered by computer and completed by the students. Procrastination was behaviorally operationalized by (a) most aversive task start time, and (b) the amount of time taken to finish the four required tasks. In comparison to the participants who did not expect to be evaluated, findings revealed the aversive task was delayed considerably longer by the participants who had expected evaluation. High-trait procrastinators were more affected and took longer to complete the tasks when they anticipated evaluation on their performance (Senécal et al., 1997).

**Cramming**

As previously discussed, adept students use a wide array of study strategy approaches. Cramming can be operationalized and defined depending on what the term is being pertained to. A more general definition of cramming has been described by Sommer (1968), who defined cramming as, "a period of neglect of study followed by a concentrated burst of studying immediately before an exam (Mclntyre & Munson, 2008)."

Although multiple definitions have been developed to describe cramming, few have described cramming gradation; therefore, the following question can arise: Are there degrees or levels of the cramming study strategy that can be measured? It is also difficult to incorporate a specified set of criteria that can facilitate the successfulness of cramming as a study strategy. More specifically, if a student primarily uses the cramming method to study, is it considered to be a successful study strategy if the student's course grades are high, but their processing and comprehension of course concepts are low?

One major study investigated cramming study strategy definitions and measures. Mclntyre and Munson (2008) asked 160 students from 9 upper-level marketing courses, who had previously taken the Principles of Marketing course to participate in their study. To measure comprehension and recall of material from the course, a multiple-choice master test (MT) that contained content from the course was administered.

Of the 160 total students, 45 undergraduate students were asked to provide a description of a common study strategy they used in their courses. Responses to the question and ratings on their "degree of cramming" were grouped together to form three study strategies (SSs). Extreme Cramming was the first SS, which was used to describe students who avoid reading assigned course materials. These students delay reading course materials until there is only a small period of time available before the scheduled exam. Keeping Current and Reviewing for Exams All Quarter was the second SS. Students who use this strategy read the assigned course materials as they are scheduled via the instructor. The course material is studied and reviewed frequently throughout the course term and in advance to the scheduled exam. Keeping Current and Cramming A Day or So Before the Exam was used as SS three. This study strategy was used to describe students who regularly read course materials as they are assigned, but the course materials are not reviewed until a day or two before the exam is scheduled (Mclntyre & Munson, 2008).

Student responses were then used to guide the development of the Study Strategy Survey; a written survey questionnaire which served to answer 4 research questions regarding the prevalence of cramming among students, student opinions on cramming efficacy, cramming effectiveness as a determinant in course grades, and the impact of cramming in relation to the long-term retention of course material. Results from a chi-square test concluded that 45% of

students reported cramming as their primary study strategy used for most of their college courses. In the Principles course alone, 48% of students reported cramming as the strategy they applied to study (Mclntyre & Munson, 2008).

**Efficacy.** A large number of studies demonstrate cramming is an effective study strategy. This results from equal study and retention intervals. However, cramming often limits the retention of learned material as the retention interval increases. After an extended period of time, the ability to recall previously gathered information gained from cramming fades and eventually is forgotten (Tigner, 1999). However, the duration of time that must occur for this to take place is not well-known because many research studies were conducted over short durations of time.

One study examined the effectiveness of cramming using 166 participant that attended a small, private university in Washington. The students who frequently engaged in cramming were juniors and seniors, which suggested that students who cram more often have attended college longer. The average crammer had a 3.2 GPA and was found to perform equally or better than students who use other study strategies. Cramming was most commonly used in writing intensive courses and when a course required a broad range of coursework to be completed outside of class (Vacha & McBride, 1993).

Another study examined the efficacy of cramming by splitting 35 participants into a crammers group and a non-crammers group. Both groups were provided with a study sheet containing pairings of 15 symbols and 15 English alphabet letters. Both groups also received a test sheet that listed the symbols in a different order and required participants to match the corresponding letters they were paired with on the study sheet. Participants were also required to complete a sheet containing two mazes. The non-cramming group was asked to complete the

mazes during the five-minute period between the allotted time for studying and test taking, while the cramming group was asked to complete the mazes after their test completion.  In comparison with the non-cramming group, results revealed the cramming group performed just as well with no significant differences.  Out of 15 total points, the combined average of group score surpassed 13.4 (Van Note, 2009).

Finally, Brinthaupt and Shin (2001) investigated the connection of the cramming study strategy to the flow state of 161 undergraduate self-identified crammers and non-crammers.  A flow state occurs when there is a stable merge between a challenging task and an individual's abilities.  Students were required to read through the administered instructions and textbook material for 10 minutes, and complete a multiple-choice exam on the material, the Academic Procrastination State Inventory, and the Flow State Scales (FSS) assessment regarding the flow they experienced throughout the cramming and exam sessions.  Findings indicated that higher flow and test scores were reported by students who often employ cramming as a study strategy than for students who do not employ cramming.  Students with high self-reported cramming index scores indicated higher procrastination scores and those scores were strongly correlated to cramming for who students who report cramming because of necessity rather than for crammers who report cramming by choice (Brinthaupt & Shin, 2001).

CHAPTER III

SUMMARY

Correlations exist between exam scores and time spent studying (Schmidt, 1983). Prior research has shown that students who procrastinate often wait longer to study and study less than students who procrastinate less often (Pychyl, Morin, & Salmon, 2000). Thus, the likelihood of cramming is increased as a result of the delayed study time caused from procrastination (Brinthaupt & Shin, 2001).

Although cramming is widely recognized among educators and students, most of the limited research that exists on the topic of cramming is obsolete. In addition, studies that have focused on the experimental control of cramming behavior are rare, and researchers have most often investigated only the views and concepts that correlate with cramming (Van Note, 2009). Few, if any studies have been conducted to specifically determine existing relationships between cramming and examination format.

The reviewed studies have clearly indicated college and university instructors use multiple examination formats to assess student performance. However, instructors and college students prefer some examination formats over others and readily justify their choice. Ideally, the format should be selected by examining the purpose of the assessment related to levels of intellectual behavior or cognitive ability (Asklund & Bendix, 2003).

Yet existing research has not established if students' study tactics are specifically utilized in response to a given format. Some researchers have suggested that a test expectancy effect occurs when students know the exam format before it is administered. From this expectancy students will modify their cognitive processes to meet the different demands and requirements of the acknowledged format (Ross et al., 2006). If demands are minimal, it can

reasonably be assumed that little emphasis will be placed on studying. In response, cramming behavior will likely increase if studying is not a priority.

Although students often choose to cram for examinations, the interpretation of the cramming study strategy is varied across researchers. Studies that focus specifically on cramming are limited, yet most researchers who report test effectiveness are in agreement; cramming is a widely popular study strategy college students choose to employ. This is supported throughout numerous studies across the past few decades.

The overall successfulness of the cramming study strategy has not been established. This ambiguity across existing research has raised pertinent observations. First, differences in cramming behavior across each examination format are rarely indicated in the existing literature. In addition, the length of time crammed information is retained is indefinite. Finally, research has not established if student performance is impacted when crammed information cannot be reviewed before a re-administration of a previous examination. The uncertainty restricts the overall significance of previous research findings.

CHAPTER IV

RECOMMENDATIONS

Scholars and researchers are well aware of the pervasive usage of cramming strategy across the educational settings. However, research on this issue is by no means exhausted. The value of cramming is somewhat limited and ill-specified. Although similar scores are often obtained by cramming and non-cramming students, students who do not cram often retain studied information over longer time periods. Furthermore, research has not established if cramming is utilized when students prognosticate exam format, or if better scores are produced from cramming when one format over another is administered. This indicates a need for further research.

It is recommended that future researchers examine the efficacy of the cramming study strategy to examination format. Whether format is significant or not, the effectiveness of cramming will be realized by students, and better examination formatting decisions can be made by educators. For instance, if cramming has no relation to format and students receive high scores regardless; educators might conclude that students cram for all exam types. Rationalizing this allows educators to administer exam formats that require students to use critical thinking and deductive reasoning skills verses exams that introduce questions promoting memorization of detailed events, facts, and lists.

Educators' chosen examination formats should be continually revised and constructed based off of previous research outcomes. Findings suggest that frequency of examination administration is indicative to student study strategy methods. To discourage cramming, exams need to be more intermittent. Frequent exams do not allow for sufficient study time. Deficient

study time may encourage cramming behavior and reduce the ability to retain crammed knowledge over extended time.

In addition, future researchers should further investigate the differences and similarities in individual traits, backgrounds, and examination format preferences of students who cram and students who do not cram.  Although it has been established that individual traits affect study strategy approaches, background comparisons between these students (i.e. race, culture, age, sex, etc.) are not commonly reported.

Furthermore, researchers must examine students' perceptions about any potential educational or career outcomes they think may result from their chosen study methods to various examination formats.  Questions may include: What are the repercussions of cramming?  Do the resulting short-term cramming pay-offs outweigh lengthy study time and prolonged information recall?  Do cramming and/or type of examination format inhibit overall academic and career performance? And, do oral examinations prepare students to "think on their feet" and develop critical thinking skills that may be essential to future success?

Finally, it is probable exam performance is influenced by cramming behavior and/or the administration of oral exams.  Multiple influences cause exam performance to be impeded. Educators must learn to recognize influences, such as social anxiety.  Debilitating effects result from social anxiety.  Students with the disorder may fear exams that require oral responses because their responses to the questions will be witnessed by other peers.  Their focus becomes shifted from the exam to how their appearance will be perceived by peers.  To avoid prolonged thought about the impending oral exam, studying is continuously delayed and cramming becomes used as a study strategy.  For privacy reasons, the method of administration may be also protested by students who do not fear exam questions that must be answered orally.  For these

reasons, educators who choose to administer oral exams should administer exams privately to each student.   Confidentiality will be upheld and occurrences of cramming behaviors will most likely be reduced.

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