EXECUTIVE FUNCTION AND STRESSED COLLEGE STUDENTS: A

PHENOMENOLOGICAL STUDY TO INFORM INSTRUCTIONAL DESIGN

by

Donna-Maria Trewhella

Liberty University

A Dissertation Presented in Partial Fulfillment

Of the Requirements for the Degree

Doctor of Philosophy

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Abstract

The purpose of this phenomenological study was to describe college student stress experiences that impact executive function (EF) and cognition at one community college in California. The conceptual framework guiding this study was cognition and executive function concepts that are impacted by the stressed learning experience. The central research question asked: What was the lived experience of EF deficits for stressed college students when learning content from instructional design (ID)? The methodology employed a qualitative phenomenological study that sampled 13 college students who self-identified as experiencing stress during the learning cycle. The research was conducted via the Internet and Confer Zoom within one California community college. Data collection included a writing prompt, semi-structured interviews, and a focus group. The analysis approach employed Moustakas' (1994) modification of Van Kaam's data analysis through detailed descriptions of the stress impact on the learning lived experiences. The results provided rich descriptions of participant stress occurrences affecting EF and information processing, compounded by ID impact and conflicting learner preferences.

Keywords: stress, cognition, executive function, instructional design, empathetic design

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Dedication

To my parent, whose parenting gave birth to this study.

To my son, may you never know chronic stress.

To the Lord my God who forgives sin and remembers them not as far as the East is from the West, and for His healing and help throughout this journey.

Acknowledgments

I fervently acknowledge the aid and advice of my dissertation chair, Dr. Saba, in making this manuscript come to fruition. To my son, who patiently waited for the journey's end, I thank him for his tolerance and understanding toward the pursuit of knowledge.

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CHAPTER ONE: INTRODUCTION

Overview

Instructional design (ID) practitioners are most vulnerable to the lived experiences of the learner that affect how students interact with academic materials. Instructional designers employ rigorous methods for the analysis, development, delivery, implementation, and evaluation (ADDIE) processes for course creation in higher education (Larson & Lockee, 2013). Course design structure follows methodological and practical application to instruction for various disciplines. While guiding the iterative process of ID, there is great care and focus on course design evaluating student learning outcomes (Larson & Lockee, 2013). However, evaluations need to consider learner experiences that impact academic performance. Students experience stress, for example, from procrastination, competing life responsibilities, and relational demands (Rafidah et al., 2009). Stress results in cognitive and executive function (EF) deficits, thus producing poor academic achievement (Xie et al., 2019a). To further understand the stress phenomena, this chapter outlines the history of ID research, the social impact on learning during stress episodes, and the theoretical underpinnings that guide ID thinking regarding learners' external and internal obstacles that should propel learning design. Further, the chapter provides the research problem, followed by the purpose of the study. Then, the research demonstrates the need for the study, followed by the research questions, definitions of key terms, and the summary.

Background

The literature background regarding stress and ID considerations for EF-centered task development was limited. Research on cognition exists as it applies to course design and content (Malanchini et al., 2019; Sweller et al., 2019). ID and associated design models have enjoyed

much study for decades (Mayfield, 2011; Tracey & Hutchinson, 2019). Researchers are still adding to the work toward business, government, and education instructional improvement. However, this study focused on higher education course design that considers a sympathetic approach to support EF cognition and academic performance during stress.

Historical Context

Robert A. Reiser (2001) wrote about the history of ID, which gave an account of the field's development over many decades in the United States. His account began with wartime when the military sought educational and psychological specialists to design training and begin research on human behavior and instruction. Robert Gagne, Leslie Briggs, and John Flanagan were among the first to attend the military task. B.F. Skinner's (1954) incremental approach to instruction and design in the article entitled *The Science of Learning and the Art of Teaching* was groundbreaking work. In the behavioral objective era, which was developed by Tyler, (1975) during his eight-year study, objectives were written to express the type of behavior expected from the learner, which offered a means of evaluating learning outcomes. Later, Ralph Tyler's work was popularized by Bloom et al. (1956) published work entitled *Taxonomy of Educational Objectives*. Additionally, the wartime effort propelled the evolution of the ADDIE process for ID, which emphasized the need for a linear and a systems approach to learning specified job tasks (Allen, 2006).

Further important ID work came from the publication of *The Conditions of Learning* by Robert Gagne (1965b), in which elaboration of learning outcome types was correlated to instructional classes, which is still evident in ID design today. Gagne and Glaser (1962) coined the term *instructional design* in their systematic approach models. While interest continued to grow around the development of ID models, the invention of the computer saw a need to

accommodate learner interactivity. Merrill et al. (1990a, 1990b) were pioneers of this advancement in ID. Around the same time, views on learner interactivity drew conversations about problem-based learning requiring students to engage in instruction rather than just as recipients of knowledge through education. The views were labeled as constructivist and involved learners solving real-life problems in both teamwork and as individuals while employing different perspectives. More recently, distance education became a reality for online learning, which also heavily impacted ID (Reiser, 2001). Learners attempting instruction remotely are exposed to situational experiences that generally are not found in the traditional classroom. While using the internet, no physical instruction directs attention to learning activities. Students are vulnerable to motivation, attitude, and external or internal pressures that can negatively influence learning. Exposure to such distractions emphasizes the need for ID to be flexible in design thinking to provide an understanding of the learner experience. Furthermore, ID supplemental resources can guide students' cognitive and EF toward successful academic performance for the stressed-out college learner.

Social Context

Learning challenges involving cognition and EF of stressed college students affect academic performance (Xie et al., 2019a). Learning challenges also affect the nature of ID, which examines assessment and evaluation results at the end of course completion through student grades and feedback (Larson & Lockee, 2013). Supplemental learning resources should exist to exercise mental processes, redirect stressed thoughts, and facilitate increased cognitive and EF. When these resources are not designed into courses, student-provided feedback utilized during a generalized iterative phase of instructional redesign can skew data. Data from misapplied feedback negatively affects the efficacy of both ID and the practitioner, impacting the

success of an educational course with ripple effects within the discipline and the school's competitive ranking. Instructional designers may benefit from researching stressed learners.

Stress is common during adulthood, resulting from relational, social, domestic, familial, financial, academic, and employment demands. Toward the advancement of instruction, different sources of stress and student academic achievement have been researched in recent years (Arditte et al., 2018; Margolin & Vickerman, 2007; Rafidah et al., 2009; Xie et al., 2020). These authors addressed the complexities of the impact of stress on cognitive processes and learning outcomes, which should inform the instructional designers' profession. No related literature has focused on the college student stress experience as applied to instructional designers' processes in planning for dysfunctional learning.

Theoretical Context

Cognition research by Hattie and Bolton (2017) added to the works of psychologist Piaget, who observed children and their levels of mental development as their minds adjusted to learned experiences and situations. The authors asserted that learning performance repeated over time influences students' learned experiences, either adding to or retarding skills growth and brain maturation. Piaget was interested in the cognitive mapping of the brain that supports skills growth. Recent observations quantitatively measured this (Hattie & Bolton, 2017). Further studies were conducted on inhibition in the diversity of control adjusting performances, affecting learner participation, shifting, group activities, and updating working memory (Miyake & Friedman, 2012), which affected academic performance. Limitations in learner abilities, either articulated as EF or cognitive ability, have been noted during stress from different forms of abuse.

Further research on EF comes from the work of Banich (2009). EF included the mental processes for switching tasks, working memory temporary storage, categorizing, and sequencing information, prioritizing, and focusing attention. These cognitive processes affect functional learning when the student can intellectualize situations that require EF utility. Agreement among researchers exists in the human capacity to be mindful, which partially includes the ability to perform specific tasks (Banich, 2009; Ramos-Galarza et al., 2019). Learners must switch thought processes when goals change, employ new ideas that correlate to the moment or categorize abstractions and further information for use in unusual situations (Banich, 2009). Ramos-Galarza et al. (2019) advocated for repeated practice of higher-order thinking due to the aging process that wanes as skills become unused. Life stressors can impede EF increases or maintenance. Additionally, EF skills require mental elasticity to task switching without comprehending a precisely named rule to control performance during problem-solving, and cognitive impairment can result from aging, depression, frontal lobe injury, substance abuse, or attention deficit (Banich, 2009; Gould et al., 2012; John et al., 2019). Working memory used during learning, a part of EF, demonstrates the ability to hold onto information long enough to transform tasks that gather new knowledge into long-term memory (Banich, 2009). All these components depend upon EF's flexibility and efficacy. Higher-ordered thinking, therefore, must be unimpeded by outside factors, such as stress.

Problem Statement

The problem was that the college student stress experience impacts EF at the point of learning. Life stress can hamper the building or upkeep of EF (Ramos-Galarza et al., 2019). EF deficits impede learning and result in poor academic performance (Banich, 2009). Research suggests EF would benefit the learner by mitigating stressors before learning occurs (Sweller et

al., 2019). However, stress is an integral part of academics, and the basic assumption was that college students receive little training to interpret stress severity levels or how stress influences learning (Rafidah et al., 2009). Thus, students' use of mental processes when attending college coursework may benefit from implementing supportive tasks aligned with lesson objectives requiring specific cognitive efficacies to attain learning outcomes (Li, 2018). A gap in the literature exists connecting ID to stress identification, course design, and the student stressed-out learning experience.

Purpose Statement

The purpose of this phenomenological study was to describe college student stress experiences that impact EF and cognition at one community college in California. At this stage in the research, EF was generally defined as accessing working memory to transition short-term memory information into long-term knowledge and using higher-order cognitive processes (Banich, 2009). The conceptual framework guiding this study was executive function, a part of cognition. Cognition consideration is an essential component of the iterative ID process, which relies on student feedback for course efficacy and learning outcomes, depending on the practitioner's existing knowledge that designed content does not add to a learner's mental load (Larson & Lockee, 2013). How a learner's EF deficits influence learning outcomes should determine supporting resources that increase EF before undertaking graded activities.

Significance of the Study

This study had theoretical, empirical, and practical significance. The executive function conceptual framework by Banich (2009) informs this research, which sought to discover how students are affected by stress that causes learning challenges. This contributed to the empirical literature on stress and learning challenges by investigating stress experiences during the learning

event. The practical significance offered perspectives to instructional designers' generalized practice for those who seek to understand the stressor influences on cognition and EF.

Theoretical

This work sought a new application of EF's conceptual underpinnings by discovering an understanding of student-stressed cognitive intrinsic motivations, control, and self-regulated learning. The findings supported improved design practice for tasks involving EF skills, such as sequencing, organizing information, and addressing working memory during stress. Learners need different types of learning support and training and benefit from instructional scaffolded tasks, beginning with the simple and progressing to more complex, providing supportive and procedure examples along the way (van Merriënboer et al., 2003). These tasks should be designed empathetically and supplemental to instruction for those students who intermittently or regularly require this type of learning support. Creating these offers students a way to stimulate cognition, clear the mind fogged by stress, and provide recall or recognition of task performance or build upon task mastery.

Empirical

Previous researchers focused on student anxiety experiences from academic pressure, social relationships, and gender differences (Andrews & Wilding, 2004; Beilock et al., 2004; Dube & McGiboney, 2018; Duran et al., 2020; Heo & Han, 2018; Kar, 2017; Pierceall & Keim, 2007; Rafidah et al., 2009; Zeidner & Matthews, 2018). Some research focused on components of cognition and EF from the influence of childhood and adult stress (Gould et al., 2012; Hedges & Woon, 2011; John et al., 2019; Margolin & Vickerman, 2007; Palmer, 2013; Rahdar & Galvan, 2014; Szulewski et al., 2020). Other researchers focused on instructional interventions for anxious learners by providing student exercises to cope with anxiety, some during task

performance, and others offering institutional resources (Malenczak & Nemec, 2017; Robotham & Julian, 2006; Sweller et al., 2019). This transcendental phenomenological study contributed to the literature by describing how students who experienced stress during learning affected the efficacy of ID.

Practical

Understanding those EF processing skills impacted by stress benefits the ID field in several ways. First, considering the student's approach to stressed learning offered the practitioner new insight into how external and internal stressors affect student academic performance. A sympathetic approach to design exposed iterative ID assessments when not considering stress as a confounding part of academic performance (Tracey & Hutchinson, 2019). Accurate feedback from students about their stressed learning experiences with materials in the course impacted interpretations of exams and assignment score outcomes. For example, students who do poorly on an assignment that requires EF skills result in inattention, lack of motivation, inability to recall, self-regulation, or inhibition due to stress.

Research Questions

The study assumed that stressors affect student learning cycles and that remedies are needed to aid academic performance. Instructional support is required to address the resulting cognitive information processing deficits and EF. Remedies affect ID assessments, allowing for a better redesign of course materials.

Central Research Question

What was the lived experience of stressed college students suffering executive function deficits as they attempted to learn content from instructional design?

Sub-Question One

What mental processing challenges does a student experience caused by stress when attending to coursework?

Sub-Question Two

What meaning do stressed college students ascribe to how coursework was designed?

Sub-Question Three

What cognitive decisions do stressed-out college students make when faced with complex learning coursework?

<div align="center">Definitions</div>

1. *Cognitive Overload* – The mental state that learners experience when there is too much content designed in learning material that conflicts with visual and aural mental coding processes, including context where graphics are not aligned correctly next to definitions or word descriptors (Larson & Lockee, 2013).

2. *Empathetic Design* – Permits the designer to apply reflections from past personal experiences that impacted learning from the beginning to the end of the learning process. Such reflection may allow mindful consideration for creating instructional content that leads students to an imagined outcome from a place of focus and attention to the learning (Tracey & Hutchinson, 2019).

3. *Executive Function* – This includes higher-ordered thinking to include, in part, sequencing, categorizing, using working memory that can handle a limited amount of information at any one time, inhibition, and cognitive plasticity (Banich, 2009).

4. *Instructional Design* – The classification of the management, systems, models, and production for instructional training and learning (Branch & Dousay, 2015).

Summary

The problem was that the college student stress experience impacts EF at the point of learning, exacerbated by an indifference in ID general practice toward this issue. The purpose of this phenomenological study was to describe the condition of stress on learning experiences for students at one community college. This chapter outlined the problem regarding student stress that impacted EF's cognitive processes and academic performance. ID practitioners should consider adult learner EF and cognitive learning difficulties within the ID methodologies and practices for higher education. Learners experience stressors through everyday life, which are present when approaching learning. Miyake and Friedman (2012) asserted that adults suffer EF challenges affected by stress, with variations of onset, either from childhood or later in life. Little, if any, of this research has been applied to ID models as a mindful approach to stressed learning challenges.

CHAPTER TWO: LITERATURE REVIEW

Overview

A systematic review of the literature, published mainly over the last five years, is conducted to investigate the problem of stress experienced during the learning cycle for college-aged students in higher education. Chapter Two reviews the current literature on stress and cognition influencing executive function (EF) processes. The first section discusses EF, with a correlated section as part of cognition and its related components. A synthesis of recent literature on student stress, which impacts academic performance and (ID) methods, is included. Sources describe student stress with environmental, relational, and social influences. The summary reveals the gap in the literature to illustrate the need for ID adaptation and further targeted research addressing stress impacts on learning.

Conceptual Framework

Potential learning difficulties experienced by adults in higher education began with a perspective of the work involving the cognitive framework of EF by Banich (2009) relating to metacognitive control. The conceptual framework guided the perspective on EF for the field of ID generalized processes in consideration for stressed learning deficits as a common standard for design practice. The conceptual framework shaped this study's research questions to describe the stressed learner's EF and cognitive challenges during the learning cycle. Data collection and analysis allowed the researcher to gather and cluster the phenomena of adults' lived experiences under stress. The results informed the EF conceptual framework in such a way as to advance its construct.

EF was explained, in part, to include the mental tasks that involve working memory, switching cognitive tasks, sequencing information, controlling behavior, and maintaining

attention (Banich, 2009). EF partly describes how to self-regulate a student's self-awareness and self-perception, monitoring the social and physical environment, and includes information processing (Zimmerman & Schunk, 2001). Controlling inhibition was vital to learning success (Miyake & Friedman, 2012). Understanding each of these constructs of EF provides a basis for ID analysis, design, development, implementation, and evaluative methods and is a means to guide the design of instructional content.

Banich's (2009) work asserted that humans could intellectualize situations toward successful outcomes. Researchers agreed on the human capacity to perform specific mindful functions (Banich, 2009; Ramos-Galarza et al., 2019). These include categorizing and sequencing, prioritizing, controlling behavior, crafting and creating ideas, task switching when goals change, and detecting abstract and novel information for use in new situations (Banich, 2009). Higher-ordered thinking, as the cognitive construct of EF, is a part of student academic success, and this ability can increase with repeated practice focused on specific types of higher-order skills, which otherwise may diminish without use over the life course (Malenczak & Nemec, 2017; Ramos-Galarza et al., 2019). Authors Cowell et al. (2015) and Ramos-Galarza et al. (2019) agreed that significant life-produced threats, such as physical abuse, can impede EF development or preservation. Research into the more severe disruptions to EF suggested that life threats negatively impact the prefrontal cortex development in children, remaining through adulthood (Cowell et al., 2015; Gould et al., 2012). Stress threat mitigation research suggested different methods of coping, including problem-focused approaches to remove the problem (Zeidner & Matthews, 2018). At the same time, specific encounters of emotion-focused management to maintain emotional equilibrium can come through uttering negative emotions to ease the stressful situation (Zeidner & Matthews, 2018). Margolin and Vickerman's (2007)

exploration of stress addressed complex trauma as events involving prolonged and chronic traumatic experiences, adversely affecting the brain development in young children, with most of these events happening in families. Of the six domains the authors defined, two are of interest to this study: emotional regulation or controlling anger and learning difficulties related to information processing, intentional mind wandering, and concentration. The authors asserted that, due to the overwhelming lack of maintenance of everyday interpersonal relationships experienced by these youth, even minor stress can become out of proportion within the context of the event. Additionally, lesser forms of anxiety can still impact working memory from worry, affecting task performance and updating memorized information (Bredemeier & Berenbaum, 2013). The research clearly outlined the detrimental effects of stress impacts on EF.

Related Literature

The related literature review described adult EF learning challenges experienced during the educational cycle. EF skills and abilities are described as applied to student learning and academic performance. The defined characteristics of executive and cognitive functioning difficulties were essential to the manuscript to discover ways the instructional designer's role could advance student learning outcomes (Xie, 2021). The curriculum design, in part, relies on student feedback, which historically has been requisitioned from efficiently crafted questionnaires and surveys that seek out root problems experienced during learning (Larson & Lockee, 2013). However, generalized survey instruments do not correctly measure learning performance unless such tools provide open-ended questions and answers from the student for personal reflection on life stressors and how those impact the learning experience. Trying to learn with clouded mental processing impacts cognition (García-Campos et al., 2020; Gould et al., 2012; Kremer et al., 2019; Mayer et al., 2019; Rahdar, & Galvan, 2014); information

processing, (John et al., 2019; Margolin & Vickerman, 2007; Sharit & Czaja, 2020); working memory, (Feldon et al., 2019; Plancher et al., 2018; Plass & Kalyuga, 2019; Skulmowski & Xu, 2022); attention, (Beattie et al., 2018; Feldon et al., 2019; Malenczak & Nemec, 2017; Margolin & Vickerman, 2007; Plancher et al., 2018); motivation, (Heo & Han, 2018; Patall & Zambrano, 2019; Robbins et al., 2006; Ryan & Deci, 2020; Seufert, 2018; Skulmowski & Xu, 2022; Yeo & Neal, 2008; Xie et al., 2020; Xu et al., 2021); emotion, (Kremer et al., 2019; Park et al., 2014; Plancher et al., 2018; Xie et al., 2019a; Xu et al., 2021); self-regulation, (Duran et al., 2020; García-Campos et al., 2020; Seufert, 2018); and academic performance, (Andrews & Wilding, 2004; Malenczak & Nemec, 2017; Rafidah et al., 2009; Robotham & Julian, 2006; Skulmowski & Xu, 2022). Learning challenges also impact ID efficacy (Keahey, 2021; Martin, 2018; Sentz et Fal., 2019; Sweller et al., 2019; Tetzlaff et al., 2020). Effective ID, therefore, should focus on feedback from learners for their cognitive and EF stress experiences, self-regulation, academic performance, and learning challenges. Projecting instructional processes that direct the learning redesign should consider performance measures, standardized tests, and grading stipulations to assess students' basic needs during learning (Ryan & Deci, 2020).

Instructional Design (ID), Cognition, and Executive Function (EF)

The following section explored the research on the states of cognition and related EF to ID considerations during the design process. Understanding EF and its correlated self-regulation and working memory capacity are essential to an ID process sensitive to these combined components. Self-regulation is an essential component of effective learning. Loss of recall and working memory can influence student academic performance through and by ID efficacy.

Student cognitive ability assessment in higher education has been the unique focus of research toward advancing instruction (Gratton et al., 2017; Plass & Kalyuga, 2019). Some

studies addressed the dynamics of cognitive control and instructional tasks set for students as an essential learning assessment (Bernacki et al., 2020; van Merriënboer & Kirschner, 2018). Tasks used to measure or increase levels of control through shifting rules around, crafting new conceptual ideas, and determining mental flexibility may be helpful to learners when attempting learning outcomes (García-Campos et al., 2020; Ji & Wang, 2018; Szulewski et al., 2020). Gratton et al. (2017) stated that essential to learning was to switch instructional tasks set for learners via the levels of cognitive control. The authors asserted that shifting rules around, creating different concepts, and assessing mental flexibility are helpful to learners during activities where cognitive control mechanisms become variable in older adults. So, providing exercises to increase working memory capacity could benefit learners. Learner recall was a crucial consideration for ID over the progression of a semester-long course where students may encounter intermittent adult-onset learning challenges (Miyake & Friedman, 2012) and overall EF periods of decline (Gratton et al., 2017).

Banich (2009) stated that broad topics of EF include appraisals of an individual's judgment and behavior in systematized situations. The author's research included students demonstrating flexibility to switch tasks without understanding specific rules to direct behavior during problem-solving. She asserted that a person's ability to follow procedures or rules is aligned with EF's capacity. Limited adaptability in these areas correlates, in some cases, with cognitive impairment caused by substance abuse, depression, aging, or resulted from attention deficit disorder (Banich, 2009; Dube & McGiboney, 2018).

Research into learning challenges established neurological deficits that impact cognitive processing (García-Campos et al., 2020; Hedges & Woon, 2011). Well-structured neural networks direct the ability to perform tasks (Cohen, 2015; Cowell et al., 2015). García-Campos

et al. (2020) ascribed to the belief that brain pathways can relay to target areas of learning called the *recognition, strategic,* and *affective* networks. The authors stated that finding meaning from information presented to a learner involves recognition and looking back to previous information to find new understanding. Learning networks involve EF skills as learners manage the strategic phase of the learning cycle. Emotional importance was assigned during the affective network as the learner assesses or recognizes patterns (Arditte et al., 2018; García-Campos et al., 2020; Park et al., 2014; Tracey & Hutchinson, 2019; Xie et al., 2019a).

Self-Regulated Learning

The related literature on self-regulated learning explored students' ability to be self-aware of learning strategies, including control of inhibition, cognition, information processing challenges, accessing working memory, impacts on motivation, and attention. Authors García-Campos et al. (2020) posited utilizing ID processes that steer learners towards self-regulation by emphasizing goals and inclusive feedback to encourage cognitive flexibility, see different perspectives, and take responsibility with decisions about planned learning strategies, which are vital to strengthening EF skills. Both information processing, a part of EF, and cognitive construction were of interest in this review as they motivate the responses from a learner's instructional experience and academic performance (Zimmerman, 2002; Zimmerman & Schunk, 2001).

Self-regulated learning has several lesser components that direct interest in critical ways for understanding the learner-initiated acquisition of new knowledge. Zimmerman and Schunk (2001) asserted that these include, in part, phenomenological methodologies, cognitive information processing, and constructivist methods. Critical approaches are cognitive constructivism and information processing. First, cognitive construction consists of the self-

propelled willingness to learn and maintain equilibrium with new knowledge aligned with existing representations of information (Zimmerman, 2002). Cognitive construction incorporates self-awareness and identifying with strategies to learn and perform (Zimmerman, 2002; Zimmerman & Schunk, 2001). Zimmerman and Schunk (2001) and Robbins et al. (2006) asserted that the mental processing of information can cloud the perception through learner self-doubt or anxiousness, including self-awareness regarding the ability to learn.

Learning skills impact a student's ability to succeed and achieve goals toward higher educational degrees (Tadesse et al., 2021; Zimmerman, 2002). Skills applied toward long-term projects require developing and understanding the nature of self-regulation to work toward completion and self-fulfillment (Zimmerman & Schunk, 2001). Acknowledging self-reliance to achieve success was crucial since self-regulation is more than just performance; it is also about self-awareness of applying those skill sets to different learning environments (Zimmerman, 2002). These skills are teachable and developed by offering learning supports, including strategies to approach a task and then guide through self-reflection opportunities to improve performance. Andrade (2020) argued that soft skills should be taught throughout academia to support lifelong learning and connect employment to educational and collaborative knowledge acquisition. The author asserted that assignments emphasizing soft skills with complex learning tasks, aligned to internships or cooperative team-based projects, assisted toward goal-driven outcomes. Student independence for their own learning benefits retention, achievement levels, and insight into workplace career advancement (Hawe et al., 2019). The authors posited that task-dependent assignments should inspire the student to deploy strategies to carry out the task with visualization of results based upon pre-selected outcome standards and enable the student to think concretely regarding possible solutions and be cyclical toward the task outcome (Hawe et

al., 2019). Additionally, the student's level of engagement is a determinant of academic success and is influenced by monitoring self-control (Malanchini et al., 2019; Xie et al., 2019a). Individual differences play a role in determining outcomes of self-regulated learning (Schwam et al., 2021). The authors argued that students are not adequately trained in exercising self-regulation and that classes in learning strategy would improve outcomes in online courses.

Information Processing

Banich (2009) and Beilock et al. (2004) offered a framework for EF, which included the cognitive ordering of information and swapping tasks by highlighting different mechanisms that affect performance. Task completion can involve sequencing or retaining several pieces of information in the short-term memory while mentally processing several related rules; these become interdependent upon EF ability. Knowledge of these approaches to EF for ID purposes could modify the design process for lesson structures that require higher ordered thinking specific to learning task objectives (Malenczak & Nemec, 2017).

Existing research has examined EF and why students experience learning deficits. For example, Smith-Spark et al. (2016) looked at compromised EF in adults with dyslexia who reported challenges with task completion, daily activities, monitoring, planning, task switching, and working memory. Adding this to the research surrounding deficits in EF from a teaching perspective, the curriculum should be inclusive for all students with varying abilities and those with disabilities (Smith-Spark et al., 2016). Additionally, an elementary EF-focused curriculum encouraged and guided goal setting supported sequential preparation, facilitated information organization, and enhanced progress monitoring (Vostal & Mrachko, 2021), and could be implemented for higher education (Rivera et al., 2019).

Bredemeier et al. (2016) examined EF atrophy of information processing from the effects of current and past major depressive symptoms. Their results showed behavioral measures for worsening self-regulated inhibition and mental task-switching abilities. The training of task-switching involves many characteristics and processes of EF, including goal management, selecting tasks, and transfer to additional cognitive tasks and EF control capacities (Karbach & Kray, 2009). This research revealed that EF *near transfer,* or close movement between switching tasks, was higher in adults than children after training. However, they were generalized in both age categories for far transfer (farther movement between switching tasks) after teaching.

Offering students alternative educational methods, like self-paced learning, could increase learning potential and limit information processing challenges (Ginns, 2005; Mayer, 2017). When arranging learning materials, a practitioner should not overwork dual-coding channels (visual and aural) but be mindful of how content was selected and delivered to engage the learner's working memory. Poorly constructed visual and textual information design can split learner attention and cause a lack of comprehension of materials, which ultimately can cause a loss of focus (Kalyuga et al., 1999; Mayer & Sims, 1994). Poor design affects learning outcomes, and designers must acquire assessments of course delivery to rectify design mistakes. Larson and Lockee (2013) suggested asking the following questions when developing learning materials. Was the task difficult to perform or learn, and was it dependent on the topic, or how many further topics depend on pre-existing knowledge of this task? Was the level of mastery required for learning the task/content acceptable for the level of learning? The authors asserted that a narrowed focus on the critical skills to complete the activity should not inundate the learner with extra learning, instruction, or needless information that could induce cognitive distress. The designer could prioritize those necessary skills and tie together the knowledge, skills, and other

dependent competencies by selecting information that could be procedural, hierarchical, or topical. In effect, the designer provides condensed, concise, and critical support for a successful learning outcome that aligns with the specific content's goals and objectives. Future ID research is needed for new design inventions that underscore an iterative approach with repeated involvement and alliances with practitioners (Huang et al., 2019).

Working Memory

Banich (2009) asserted that adults suffer learning challenges with working memory and information processing. Essential to EF is working memory, attributed to a person's ability to retain information long enough to process tasks and those demands to form new knowledge. This new information needs processing time to be added to long-term memory (Banich, 2009; Sharit & Czaja, 2020). Sharit and Czaja (2020) conceptualized information processing as containing three cognitive resources: encoding perceptions, having a main cognitive processing component, and deciding upon that information. When attending to designing instruction, crafting content that initializes short-term working memory should keep the active information in a present state (Malenczak & Nemec, 2017; Sharit & Czaja, 2020). Sharit and Czaja (2020) compared it to a *workbench* where everything was laid out to be analyzed, organized, contrasted, evolved, and then decided how to use the information to transfer it into long-term memory. They argued that to ensure information was stored, the presented instruction should involve verbal speech, printed text, a drawing mechanism, or images transformed into mental images that go into the main attention control processing component, which leads to decisions to accept or reject the information. They posited that too much instructional information at once does not allow adequate information processing time to transfer to long-term memory. Additionally, it was essential to plan the sequencing of information at a learner's pace. Sharit and Czaja (2020)

asserted that rehearsal was required, especially for older learners. The authors further explained that meaningful associations (analogies) of information improve working memory, retention, and learning efficacy. They suggested implementing topical sequencing of information to singularly focus attention rather than spiral sequencing.

Adding further to the understanding of working memory, authors Malenczak and Nemec (2017) proposed that poor recall may be due to a lack of rehearsal. Retrieval exercises can improve the ability to fetch old knowledge and correlate it to new information to aid long-term retention. These working memory exercises could be built into instruction to engage production in a series of learner responses to assist the student with focused attention and better recall. Research on student recall and long-term retention within four-year, 60-unit degree programs showed how learners encounter the autonomous teaching methodologies of many faculty who differ in their teaching approaches. The authors asserted that faculty generally do not build upon what has been taught before, especially regarding foundational concepts required as part of long-term retention and to apply new information. They posited that retrieval exercises were crucial to shaping learning behavior. They argued that this affects a learner's academic performance, specifically the long-term retrieval ability to analyze through *prior* logic exercises, assessing reasoning methods, free-associating solutions, and decision-making. Instructional problem-solving support can add skill in these areas (Malenczak & Nemec, 2017; Tadesse et al., 2021; van Merriënboer & Kirschner, 2018). Therefore, ID practitioners could improve instruction toward application for working memory and informational processing challenges.

Motivation

Learners perceive education with predetermined ideas about learning environments and self-perceptions regarding how they believe they would perform academically (Robbins et al.,

2006; Zimmerman, 2002). A student's sense of self (consciousness) and perceived cognitive ability to learn may correlate to task difficulty and motivation (Yeo & Neal, 2008; Zimmerman, 2002). Information processing may be based motivationally on the learner's self-doubt and anxious attention to academic endeavors or from an eager attitude toward learning as a descriptor of cognitive construction (Robbins et al., 2006).

Opportunities to develop EF skills during student learning experiences should provoke instructional designers and teachers to seek new ways to motivate and engage students through task-based learning (Plass & Kalyuga, 2019; Robbins et al., 2006). Students pursuing academic goals attempt to control behavioral and mental focus to maximize potential learning outcomes (Mayer et al., 2019; Xie et al., 2019b). EF and cognitive gains involve higher-order thinking and relational reasoning (Malenczak & Nemec, 2017; Peng & Kievit, 2020), setting goals and time for reflection (García-Campos et al., 2020), comparing and contrasting options, comprehending consequences, exercising the ability to stay focused and attentive to task completion, and maintaining stable personal emotion response to stimuli (Alexander, 2019; Szulewski et al., 2020).

Learning objective outcomes rely upon students' motivation to carefully plan and consider what and how they would use new knowledge through self-regulation (Zimmerman, 2002). Based upon the works of Zimmerman and Schunk (2001), motivations affect the capacity to self-regulate, self-awareness, and self-perspective that drive behavior. The social and physical environment affects learning and acquiring new knowledge (Kopainsky et al., 2015; Skuballa et al., 2018; Sweller, 2010). As defined by Zimmerman (2002) and Zimmerman and Schunk (2001), self-regulated learning depends on the learner's ability to participate in their learning activities mentally, motivationally, and behaviorally.

Authors Abrami et al. (2011) and Zimmerman (2002) asserted that motivation was an essential part of self-regulated learning and can influence students' level of participation in course interactions. The authors postulated that academic motivation includes the need to belong and can work through organizing groups to complete tasks to reach a mutual goal. Student drive can also influence performance mastery and highlight student self-efficacy and self-concept (Brower et al., 2022). Motivation can be varied at times and with different instructional events for student-to-student, student-to-content, and student-to-instructor interactions fostering instructional improvement (Abrami et al., 2011; Xie et al., 2020). Interaction events integrated into instruction can increase cognitive experiences while directing collective information processing energies toward a common goal (Plass & Kalyuga, 2019; Ryan & Deci, 2020). These events can enhance learner self-regulation and influence peer and instructional feedback. Student motivation toward academic tasks that require group modification, assessment, and evaluation to accomplish a shared directive can also be affected (Abrami et al., 2011; Feldon et al., 2018). Motivation influences an individual's personality toward intellectual curiosity and an openness component that shapes self-concept and enjoyment for learning, mindset, determination, and personal belief structures about the self (Malanchini et al., 2019).

Attention

Monitoring the self involves regulating attention while attempting to perform and complete academic tasks (Beattie et al., 2018; Zimmerman, 2002). Burek and Martinussen (2021) asserted that students do not recognize distractors and need to develop strategies to overcome inattention that happens too frequently, especially when seeking information online. Students are often unaware that these distractions impact test scores and attention to applied learning of course content. To address those skills, students preparing for college require practice

completing those tasks (Whiteside et al., 2016). Burek and Martinussen (2021) stated that these skills, like monitoring attention, grow as undergraduate to graduate experience continues. Given that self-regulated learning in online courses is required for successful completion, instructional learning practices should be communicated through feedback and support mechanisms that promote mastery (Perry et al., 2020). The authors stated that these could be seen partly in regular classroom practices and structured assignments, such as supporting student autonomy by providing the choice of learning challenge levels and offering peer-to-peer feedback based on instructional learning expectations. Students can gauge the distance from the goal and determine learning gaps discussed collaboratively among teams, delivering learning solutions (Perry et al., 2020).

Inattention caused by distractions was recognized as a cause of student academic distress (Bol & Garner, 2011). The authors affirmed that learning interference also comes from poor instructional lesson design using extemporaneous information and visual cues presented during lessons. Bol and Garner (2011) and Zimmerman (2002) believed ID should support cognitive and metacognitive functions because students experience learning challenges that impact organized thoughts, attitudes, and internal and external interruptions.

Adults with lowered capacity for working memory can suffer reduced comprehension from having to separate attention to text, images, and process irrelevant information (Brom et al., 2018; Fenesi et al., 2016). Engle (2018) and Kane et al. (2007) focused on deficits with working memory as related to challenges with EF and maintaining control of attention. Inattention or mind-wandering was seen as hostile toward task performance (Kane et al., 2007) and may cause a loss of relational thinking (Peng & Kievit, 2020), reflection, and understanding of consequences (Alexander, 2019). Marulis and Nelson (2021) stated that self-awareness for

thinking and reflection about a student's efficient internal thought processes can determine learning success. For these reasons, the ID practice could benefit from considering students who experience deficits with attention and need additional instructional support. The instructional content design needs to reflect appropriate types of student engagement to aid learners who struggle with inattention (Burek & Martinussen, 2021).

Instructional Design (ID) Practice

The ID-related literature looks at practice considerations, including some instructional methods currently employed in the field. In an attempt to correlate practice to learners' experience, the review introduced adult stressors that impact student learning and detailed how stressors affect academic performance. The research was taken from the education, psychiatry, and psychology sectors, which could significantly inform the ID field.

Instructional development is considered the more extraordinary overall process of ID, which has a 70-year history of differing definitions that classify the management, systems, models, and production for instructional training and learning (Branch & Dousay, 2015). Much of ID employs the ADDIE process for training materials (Branch & Dousay, 2015). Designing around competencies requires an investigation of a chosen systems' model to ensure the actual product delivered to the student meets the model's objectives. While many variations exist of ID models, this study focused on models for classroom training appropriate for use in higher education institutions but does not attest that existing models are sufficient to address stress factors affecting the learning cycle. Therefore, narrowing the focus to adapt an existing model designed around the stressed learner was within the realm of possibility.

Using a constructivist pedagogical approach to course creation for adults, instructional designers can scaffold learning events and student task performance as learning evolves during a

course (van Merriënboer & Kirschner, 2018b). The authors coined the term *deliberate practice* to define instructional steps required for learners to accomplish practicing tasks, offering a way to monitor and adjust their behavior. This way, students have autonomy over scaffolded learning, allowing the designer to consider crafting content for low and high-knowledge-based learners (Sentz et al., 2019; van Merriënboer & Kirschner, 2018b). Scaffolded learning relies heavily on students monitoring situational limitations, like face-to-face interaction guiding behavior. In online educational environments, learning lacks regular social presence with others, so self-observation becomes an internal cognitive part of the drive to complete tasks. It was suggested to further this learned skill to include student journaling to self-assess successes and failures and use as a prompt for reflection on ways to improve as part of the assignment (Song & Kim, 2021). Students can progress from simple to more complex tasks to arrive at a more explicit focus on the task at hand, which could allow the student to consider performance and assess understanding (Ryan & Deci, 2020; Marino et al., 2020; Vasquez & Marino, 2021).

Scaffolded learning should engage student attention and consider the least complex way of presenting the task through to completion. It should also be goal-oriented, make the critical features of the task prominent, address learning disappointments, and provide rubrics or examples for task completion (Chernikova et al., 2019). These should include formative instructional feedback to promote self-regulated learning, offering dual coding mechanisms through imagery and textual content where learners can use sensory channels (visual and auditory) to ingest information through their eyes and ears (Mayer & Sims, 1994).

Tiered ID support looked at providing novice to advanced learners with customizable learning directions (Vasquez & Marino, 2021). As the students practice a task using comprehensive learning instruction from beginning to end, ID can reduce support as learners

attempt the task a second time. This method supports cognitive processes and concepts that build upon EF skills. The learner could dispose of the structured teaching as they moved beyond the novice learning stage. Additionally, this can increase performance expectations. Gradually, as less instruction is needed, reduced instruction directs the learner. ID could create and plan learning experiences that align with the needs of all learning-abled and disabled students (Marino et al., 2020). Similar ID research included a *faded guidance* method of instructional support to use one design rather than the need for separate modules for expert or novice learners (Sentz et al., 2019).

With the ID aim to assist students toward self-awareness of their learning strengths and weaknesses in reaching academic goals, course creation can provide learners with additional tools to support new knowledge gains (Feldon et al., 2019; Marino et al., 2020). Student self-analysis can come through EF testing and practice opportunities during their learning experiences (Skuballa et al., 2018). Course lessons, task performances, evaluations, written submissions, video creations, and group activities all offer opportunities for ID to deliver instruction and implement educational devices that allow students to think about mastery levels (van Merriënboer et al., 2003; Vasquez & Marino, 2021). As the overarching goal, Marulis and Nelson (2021) believed that having a conceptual idea about cognition, knowledge, and monitoring (metacognition) was fundamental to assessing academic success and "thinking about thinking" (p. 208). Different instructional strategies could allow students to reflect on their accomplishments and measure EF ability before working on lesson tasks (Martin, 2018; García-Campos et al., 2020).

ID and Student Stressors

The intricate ID development processes do not adequately consider the complicated learner issues within teaching and learning contexts (Branch & Dousay, 2015). Instructional designers using the ADDIE processes do not include methods for or anticipate life trials that cause stressors for students experienced during the learning cycle. The related research looked at known types of student stress and negative emotional states that affect academic performance. The study also found that some academic stress was a positive learning aid.

Larson and Lockee (2013) suggested that there are vital questions to ask when designing and developing course materials. One of those questions would be to assess if the student found the instruction relative to their needs at that moment in time. Failing to consider the learner's characteristics, including student attitude or mindset, can cause ID to fail (Branch & Dousay, 2015; Larson & Lockee, 2013). This assessment also requires that data and analysis be collected for learners suffering from learning challenges, thus developing a student profile on which to base ID (Larson & Lockee, 2013).

Academic stress can impact college students' online learning experiences as a determinant of higher educational readiness (Heo & Han, 2018). Hedges and Woon (2011) asserted that few studies have researched stress experiences in children correlated with adult outcomes for poor cognitive skills. Their research revealed few focused attempts to compare these two phenomena affecting the brain region called the *hippocampus* and urged for more work in these areas to help with instructional content designed for the adult learner geared toward an understanding that these factors play a role in students' lives. A longitudinal study on chronic stress and affective warning signs in cognitive aging and memory recall, verbal articulacy, and

accuracy with mental processing in a birth cohort with repeated affective disorders affected adult cognitive performance (John et al., 2019).

Research on childhood abuse and neglect had lasting effects on cognition and EF abilities into adulthood (Gould et al., 2012). Stress and fatigue studies found correlations between learning and neurocognitive functioning (Palmer, 2013). Deficits in these abilities, whether labeled under EF, self-regulation, or cognitive ability, have been documented when the presence of food scarcity, stress, disease, or where different forms of abuse exist (Miyake & Friedman, 2012; Palmer, 2013; Szulewski et al., 2020). Another study focused on adult women and men who experienced life stress, where results revealed that women suffer higher amounts of stress than men (Pierceall & Keim, 2007). Problems with student finances, social engagement, roommate and dating issues, and oversleeping were investigated as they correlated to stress (Rafidah et al., 2009). Their research found that student stress level response increased or decreased at different points in the semester based on the four studied categories noted above. Research also questioned whether modern-day culture was a natural advent to stress (Rahdar & Galvan, 2014; Robotham & Julian, 2006). Robotham and Julian's (2006) research suggested that stress levels among students are rising and that young adults have greater reactivity to stress than older adults. Rahdar and Galvan (2014) measured naturalized stress experiences in teenagers in terms of brain function and cognition, which revealed the differences were marginal when compared to adults; however, the natural stress significantly impacted behavior. These compromised cognitive and EF examples are only a small sampling for a short literature review of this type. However, it provides validation that performing academic routines could be impeded by forces affecting educational development and pursuits.

Conversely, other research reported that stress may positively influence memory and learning ability (Rafidah et al., 2009). Sweller et al. (2019) asserted that some stress was inevitable in the learning task. They posited that exercises promoting mental imaginings of the stressful experience occur before hands-on experience. The authors concluded that this method decreased intrinsic load when the actual task occurred. Andrews and Wilding (2004) suggested that the stress experienced by college students would increase due to increased enrollment and the need for mental health services. The authors posited that widening college access would result in a more significant financial burden to a more diverse student population with an expected rise in stress levels.

Emotion

Emotional stimuli and negative emotional states were correlated to decreases in EF inhibition, cognitive flexibility, and working memory (Szulewski et al., 2020). Adverse or traumatic stress contributes negatively (Dube & McGiboney, 2018), and maltreatment in children last a lifetime on emotional regulation and self-control (Cowell et al., 2015). Dube and McGiboney (2018) posited that trauma significantly determines a learner's inequitable academic position, whether from neglect, violence, or abuse. They argued that instructional designers must consider that these traumatic event consequences last into adulthood and are widespread. Students face everyday challenges that can cloud mental processing and higher-ordered thinking during learning events (Malenczak & Nemec, 2017). Research showed that some adults suffer cognitive and EF deficits, some of which have been present since childhood due to lesser but more severe types of trauma-inducing stress. Dube and McGiboney (2018) posited that optimizing the psychosocial environment with a caring and empathetic approach to the learning climate recognizes *trauma-informed* learner symptoms.

Additionally, students in the learning medical environment can experience induced negative emotional states from patient and supervisor interaction, resulting in learners' depletion in working memory (Szulewski et al., 2020). The researchers considered the intrinsic cognitive load of the expert learner with a view on working memory as a broader definition accounting for the use of all of a person's mental processes. They argued that adjustments to teaching could suit theory to practice. For example, when emotional states influence performance and stressors impact the storage of working memory capacity, a learning task becomes difficult due to increased intrinsic cognitive load.

Academic Performance

While adult students need to take responsibility for learning, which requires thought, care, and consideration for how they learn, they may not necessarily consider the ramifications of inhibition control or making irrational decisions (Alexander, 2019). However, academic performance could be reduced when ID does not account for stress-induced clouded thinking. Since stress impacts cognition and EF, ID development should seek various approaches to supporting academic achievement (Vitiello & Greenfield, 2017).

A student's past experiences can influence future learning performance while adding or detracting to EF skills growth (Hattie & Bolton, 2017; Rafidah et al., 2009). Hattie and Bolton (2017) studied the work of psychologist Piaget who examined children's stages of mental development as their young minds adapted to learned experiences and environments. Piaget studied cognition, which aided skills growth as brain structures matured, leading to a mapping of EF and higher-order thinking. Adding to Piaget's field of study were Hattie and Bolton (2017), who advanced research on EF and comparatively, added cognitive constructs from Miyake and Friedman (2012) to include inhibition, which affects task completion and shifting, group

activities and participation, and taking short-term knowledge to increase working memory. Miyake and Friedman (2012) stated that these cognitive constructs affect academic performance rather than measure intelligence quotient.

Pressure to perform in academia takes away valuable working memory capacity (Beilock et al., 2004; Heo & Han, 2018). Additionally, emotions, uncertainty, and stress are all contributing factors impacting academic performance (Dube & McGiboney, 2018; Sweller et al., 2019; Xie et al., 2019a), which illustrates the need for ID interventions. Researchers asserted positive and negative emotional interconnectivity to cognition and academic performance (Kremer et al., 2019; Xie et al., 2019a). Stress management for the cognizant college student is part of a learner's educational journey (Palmer, 2013). Learners may recognize that all working memory capacity can be filled with thoughts about stressors and could negatively affect their mental state, impacting academic performance (Beilock et al., 2004; Robotham & Julian, 2006).

Approaches to student academic achievement and learning could benefit from advancing EF skill support and development (Vitiello & Greenfield, 2017). Effective ID and iterative feedback assessment must be planned and organized during the consideration of learning outcomes to consider student experiences (Larson & Lockee, 2013). For example, student information processing and academic performance could be affected by intermittent or regular stress challenges, complex schedules, distracting demands on learners' time, and varying learning challenges (Sweller et al., 2019; Zimmerman & Schunk, 2001). Understanding the nuances of learning difficulties associated with cognitive and EF variants can help the practitioner plan to reduce the cognitive load experienced during learning (Kui, 2021). Designers should project empathy toward students with limited resources, and they should prioritize support for learners with the end goal of promoting an enjoyable learning experience.

Additionally, ID should incorporate specific processes that examine learners' EF challenges when designing and delivering course materials (Alexander, 2019).

Throughout emancipation and the life course, adult students can arrive at learning from exposure to negative external experiences impacting cognition, working memory, and higher-ordered thinking (Dube & McGiboney, 2018; Hedges & Woon, 2011). Such challenges can be temporary or last for as long as the adverse events continue. Some students face learning challenges in their unique time and space (García-Campos et al., 2020). Students concurrently navigating academic pursuits and adult responsibilities could profit from additional educational support mechanisms designed into coursework that assist with focus and mental exercises specific to task-related lessons (van Merriënboer & Kirschner, 2018). Providing support types through learning aids that integrate task performance objectives and training in higher-ordered thinking can increase working memory capacity through task-based activities (Malenczak & Nemec, 2017; Reigeluth et al., 2017). Carefully sequenced task-based activities, from the simple to the more demanding, assist learners in using existing knowledge applied to new learning (Reigeluth et al., 2017). Similarly, Domínguez et al. (2013) looked at cognition through teaching instructional rules and task repetition to complete learning goals. Students progressed through short-term gaming tasks until they reached mastery before a new, more complex cycle began. This method engaged learners in a gaming environment with instant visual and aural instructional rewards but may prove frustrating in other learning scenarios. The author's results showed that students using the gaming platform scored higher overall on tasks than those given a writing assignment, showing increased motivation toward learning.

Students' willingness to autonomously organize and make learning decisions about study methods could be supported by instruction (Beilock et al., 2004). From instructional feedback,

students can learn how to reflect to improve performance, use mental flexibility by perceiving

different perspectives, and develop working memory capacity (Beilock et al., 2004; García-

Campos et al., 2020). The authors agreed that these parts of EF could be assessed to move the

learner forward and recognize that students' learning was variable and different. Learners depend

on mastery of tasks, goal setting, task analysis to improve task performance, and prior

knowledge to accommodate new learning (Larson & Lockee, 2013; Rivera et al., 2019).

Emphasis on what type of new learning students would receive from their efforts defines the

listed benefits of the learning outcomes. So, from the existing literature, there is excellent

potential for instructional designers to investigate whether adopting and including all these

considerations in the generalized ADDIE processes could improve ID.

Projecting Instructional Design

The related literature looked at reimagining several ID models' processes and

considerations for using empathetic instructional methods. It addressed how modern forms of

technology and remote learning experiences can introduce hurdles and impact students' access to

resources. These obstacles add to design challenges for today's practitioners, supporting the need

for a comprehensive reevaluation of field practices.

Instructional materials that provide support at the inception of learning require a review

of the Four Component Instructional Design (4C/ID) instruction model that focuses on four

cognitive strategies (van Merriënboer & Kirschner, 2018b). This approach employs a pivotal

learning component that specifies performing tasks involving decision-making, reasoning, and

problem-solving through supportive information. The underpinning organization of cognitive

strategies included ID facilitation of conceptual, structural, or causal model types, which could

direct cognitive function toward completing a task through diagnosis, treatment, or the feedback

thought process. The authors asserted that carefully crafted materials should begin with the learners' present knowledge and sequence through steps to gain new knowledge for the task at hand. Teaching materials should connect these old and new schemas (Patall & Zambrano, 2019). ID feedback was specific to cognitive output due to its role in learning and facilitates different perspectives for accomplishing the task through the lens of peers, teachers, and experts. Aligning theory to the learning task as the case deems appropriate, the designer progresses through increased complexities to assist the learner in building upon prior knowledge (van Merriënboer & Kirschner, 2018b).

Honebein (2016) replicated a study focused on instructional designers' values regarding ID-chosen methods as a generalized practice and how decisions over design were influenced by knowledge of the learner, context, goals, tasks, and other considerations. His conclusion led, in part, to the question of why designers do not consider learner-affective conditions during design methods. Gaps in the literature in the various versions of ID models and their related design processes lack a focus on affective domains addressing design and delivery accommodation for such difficulties.

Another study developed a training support model for STEM courses with high learning challenges and demonstrated improved motivation, metacognition, self-regulation, and sequential task performance (Bernacki et al., 2020). In the study, student self-assessment practice tasks were employed to observe whether learning behaviors would improve over time, as prior learning behaviors were assumed to be poor or inadequate upon entrance into the course. Students were to assess the tasks correlated to educational objectives, which would require usage again for subsequent tasks as learning progressed when adding new information to the old. This directed pre-training addressed that most college courses must provide supplemental learning

strategies to help students apply those to assignments. The instructional methodology for discipline-specific classes, such as the sciences, should include similar learning strategies and be standardized. The authors also argued that it was better to introduce learning strategy training at the beginning of instruction when the student time investment was focused on acclimation to the course rather than on mastery testing of learned course content (Bernacki et al., 2020; Xu et al., 2022). Further, developing these findings where interventions are deemed appropriate with mixed strategy phases were offered as plausible considerations in blended learning scenarios (Xu et al., 2022).

Vital to ID was understanding Benjamin Bloom's (1956) learning domains, specifically the affective realm, which includes attitudes and values applied to learners' lower-ordered and higher-ordered thinking skills. Designing content that attends to attitudes and values at the beginning of instruction was fundamental to the learner's success and recognizing that those elements can create obstacles that impede learning. Xu et al. (2021) asserted that learners whose emotional states are optimistic are more able to transfer knowledge and use less intrinsic and extrinsic load affecting working memory. Considering this during course design could directly impact a student struggling during a learning event. Further delineation and recharacterization of the ADDIE processes may prove beneficial to understanding learners' mental processing challenges experienced as they meet instruction.

Empathetic Design

The evaluation stage of the ADDIE process "offers a structure that aids individual and collaborative instructional development, and each phase provides a foundation for building upon and refining learning goals" (Mayfield, 2011, p. 22). This part of ADDIE enables all other phases an iterative opportunity to improve processes, inspect distribution, allow for rapid prototyping,

and assess outcomes to the learning goals (Larson & Lockee, 2013). The flexibility in the

iterative approach could also narrow the focus to cognitive considerations. Tracey and

Hutchinson (2019) addressed the need for instructional designers' future projection that draws

content creation from considering the learner's emotional condition during the learning cycle.

The authors called *empathetic design* (ED) an additional ID modeling support mechanism.

Tracey and Hutchinson (2019) posited that it permits the designer to apply reflections from past

personal experiences with stressors that impacted learning from the beginning to the end of the

learning process. Such reflection could allow mindful consideration for creating instructional

content broken down into a simple process that leads students to a potential place of focus and

attention to the learning at hand and "to imagine possible outcomes for users" (Tracey &

Hutchinson, 2019, p. 1260). As ID continues to improve, opportunities to offer a more holistic

approach to course creation should be sought, including cultural and humanized learning

experiences, with more flexibility as learning environments are fluid and ever-changing (Morel,

2021).

Instructional designers can imagine that a stressful experience has impacted the student's

instructional expertise and performance while attempting to digest that phenomenon (Tracey &

Hutchinson, 2019). The authors asserted that this type of learning intervention becomes the focus

of the iterative nature of ID and relies on specific student survey questions to draw feedback on

learning outcomes, interactions with content and materials, and perceived learner efficacy with

focus and cognitive abilities during the learning process. Tetzlaff et al. (2020) argued that

measuring student learning qualities while receiving instruction must be repeated

methodologically. They posited that learners are complex, and their approach to learning is

changeable and dependent upon the environment. Thus, instruction must be flexible and more

personalized. It is possible that ED and further research may offer a sensitivity toward future generalized instructional processes to advance additional support mechanisms for students at the point where cognitive clarity is vital to their success (Sweller et al., 2019).

It is plausible that there are design challenges with empathic design. Defining the primary construct and implementing assumptions could prove problematic for several reasons. Tracey and Hutchinson (2019) suggested that designers place themselves *in the learner's shoes*. The authors proposed a framework that differs from the ADDIE process by considering four phases to design. The first involves investigation through direct contact with the learner, either through feedback with learning content or in person. The engagement follows through immersion, mentally projecting themselves into the student's study experience and perspective. Then, the designer attempts to connect on an empathetic level with the learner, to come alongside the experience to digest what that learner experience looks like, and then ameliorate content by detaching from the experience. This allows design thought processes and the practitioner's knowledge base to combine with the emotional experience to improve the design and crafting content process (Tracey & Hutchinson, 2019). Authors Pollmann and Finkenauer (2009) stated that making instructional forecasts about the future could be accurate or biased. Still, empathetic forecasting can help designers understand learners and suggest that between-person forecasting correspondence can achieve high levels of accuracy. ID has long involved collaboration between designer and instructor for efficacy in course design (Larson & Lockee, 2013). Thus, including an ongoing student-experiential design approach could offer advantages for the learner (Heather, 2021).

Remote Learning Challenges

Modern forms of learning can also affect cognition and EF by the complexity of how ID is delivered technologically. Remote learning allows students to work from anywhere with an Internet connection. Instructional designers could offer predictions about remote learning environments and the circumstances in which students study. This includes using the technology available and its limitations, the actual environmental attributes, and the social setting (Xie, 2021). Device availability and type could affect access to learning content in the way it was displayed, and a lack of accessibility embedded into the materials could impede learning preferences (Xie et al., 2019b). The authors asserted that the remote (online) environment may not be suitable for learning due to noise levels, foot traffic, available light and power sources, proximity to Wi-Fi services, or other resources. Students learning from home around family and relatives, perhaps experiencing social conflict, could interrupt study and lack engagement (Duran et al., 2020; Xie et al., 2020). Additionally, to support the furtherance of instructional research, remote learning needs further investigation that includes a "grounding, conjecturing, iterating, reflecting" for application to educational processes that consider the ever-changing online environment and the critical iterative phase of ID (Greenhow et al., 2022, p. 141).

Researched perspectives regarding remote learning and examined engagement through empathic ID, where the final product met the student face-on (Xie, 2021). By projecting the remote learning experience, designers could conceive the potential for engagement and attitude with content and the context where learning occurs (Çoban, 2023; Xie, 2021). Attitude and perceived satisfaction with course design significantly correlate with remote learning (Çoban, 2023). Xie (2021) asserted that learning engagement interacts with cognitive ability. The author argued that the learner's actions, mental processing ability using the content, and affective and social elements are critical considerations for the designer.

Additionally, remote education can include instructional multimedia learning content, utilizing video, audio, and graphical components directly correlating to a designer's inference of the mental effort involved in processing instructions (Dawson et al., 2021). The research on the mental effort of students with and without dyslexia revealed that there exists a negative correlation between narration and dyslexia versus narration together with text and graphics, which offered increased learning performance. Additionally, digital learning experiences that provide various types of student engagement could affect cognition based on whether instruction employed irrelevant, distracting, or excessive content (Frederiksen et al., 2020; Mayer & Sims, 1994). Research in this area has demonstrated that remote learning challenges directly affect a designer's choice of instructional content, impacting the learning experience.

Summary

The research showed that much is known about cognition and EF (Banich, 2009) as it relates to deficits in student academic performance in higher education (Zimmerman, 2002; Zimmerman & Schunk, 2001) and the ID processes that can accommodate such learning challenges (Malenczak & Nemec, 2017; Sweller et al., 2019). Considerable research showed the impacts of childhood and adult stressors and their long-term effects on cognition and EF (Dube & McGiboney, 2018; Ji & Wang, 2018). Studies on different stress types received much attention for the college learning experience (Miyake & Friedman, 2012; Palmer, 2013; Szulewski et al., 2020). Conclusions on ED suggested further research toward a holistic approach to ID should consider the student state of mind during learning (Tracey & Hutchinson, 2019) or broaden the ADDIE process that includes student feedback about their learning challenges (Larson & Lockee, 2013; Ryan & Deci, 2020). Empirically, additional research on the student learning experience affected by EF deficits caused by stress may narrow the gap in the literature

to advance the efficacy of ID. This study addressed the gap in the literature on EF and stress

factors of learning occurrences that caused cognitive deficits, which resulted in poor academic

performance. This offered practical solutions to the ID field for providing types of academic

learning support targeted to help students work through those stressful experiences.

CHAPTER THREE: METHODS

Overview

The purpose of this phenomenological study is to describe college student stress experiences that impact EF and cognition at one community college in California. Chapter Three outlines the procedures and methods to complete this study. Chapter Three provides reasoning for using transcendental phenomenology research deployment and outlines the research and sub-questions to remind the reader. Then, the setting and participants are described. The following sections explain my interpretive framework, philosophical assumptions, and researcher positionality. Detailed descriptions of the data collection and analysis measures are covered, with information on the writing prompt, semi-structured interviews, and focus group interviews. Lastly, I provide assurances as to the study's trustworthiness and the ethical considerations for participants.

Research Design

I employed a qualitative study to examine human lived experiences not afforded through quantitative design approaches. This design type was appropriate when seeking to discover phenomena of lived experiences of students who suffer stress during learning that affects academic performance. I selected a phenomenological design because an individual's experience and knowledge are associated with phenomena appearing in the conscious mind, aware of sensing and perceiving an occurrence (Moustakas, 1994). Additionally, Husserl's work informed this study that no assumptions provide a researcher insight or account for prior knowledge of what and how those perceived experiences are when conducting a phenomenological inquiry (Aguas, 2022).

The rationale for employing transcendental phenomenology can be found in Moustakas' (1994) core emphasis on a phenomenon's universal structures or essences, applying intentionality to the described ontological lived experience and asking the *what* or *how* of the phenomena (Neubauer et al., 2019). While investigating knowledge acquisition, I was open to new information influenced by the environment and culture. Epistemologically, the research observer must separate from the world to be independent of the phenomena as a transcendental agent. Detailed descriptions through the role of language were formed, giving meaning to universal essences. By investigating idiosyncratically lived stress experiences, new implications and importance could be advanced to re-orient how to perceive those stress experiences. Methods of collecting data sought meaning through thick descriptions (Moustakas, 1994). I bracketed researcher subjectivity during data collection and analysis (Aguas, 2022). When writing the data, I considered different perspectives, then identified units of meaning equally and clustered them into themes to form textural descriptions (the *what* of the phenomenon) and used imaginative variation to structure (the *how*) the description, combining these to create the phenomenon's essence (Moustakas, 1994).

Research Questions

This transcendental phenomenological study explored the lived experiences of college students. The focus was filtered on stress and EF, cognition, and academic performance. The following questions directed this study.

Central Research Question

What was the lived experience of stressed college students suffering executive function deficits as they attempted to learn content from instructional design?

Sub-Question One

What mental processing challenges does a student experience caused by stress when attending to coursework?

Sub-Question Two

What meaning do stressed college students ascribe to how coursework was designed?

Sub-Question Three

What cognitive decisions do stressed-out college students make when faced with complex learning coursework?

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Setting and Participants

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This section offered details on the type of site used in the study for reproduction purposes for further scholarship. Next, details for the participant criteria were outlined. Then, rich descriptions of the participant profiles followed. Demographics of the participants are included.

Site

California-based Brockhill Community College (a pseudonym) attracts diverse groups of students from all walks of life with varied cultures, values, and belief systems. This diversity benefited the research by giving a voice to *stressed learners* not previously heard. Many students work and attend college full-time, providing a reason to choose the site for this study. The predominant group of the Brockhill Community College campus stakeholders are Latino, with a smaller group of White and African American, and still smaller numbers of Asian, American Indian, and Other. The average student was 24, with slightly over 50% female enrollment. The leadership was organized from the college president, vice presidents, deans, and chairs who are also full-time faculty who hire part-time faculty. Less than 1/4th of full-time faculty teaches in each discipline, with the majority of part-time adjunct faculty teaching most courses.

Participants

College adult participants had an average age of 24 with a sample pool size of 15,000. Males comprise less than half the enrolled population, and no males or females were selected under age 18. Variation in age was estimated to be 18- 65, and those selected followed Merriam and Tisdell's (2016) sample study size of 10-15. The participants had completed 30 semester units for inclusion in the study and filled out an informed consent form (Appendix B) agreeing to voluntary participation. Implementing a purposeful sample used by authors Harms et al. (2017) aided in the participant selection focused on those experiences of stress during the learning cycle.

Recruitment Plan

Recruitment from the purposive sample pool was approximately 15,000 students and included selecting participants who were 18 years or older, had completed 30-semester units, and using a recruitment email (Appendix D) who identified with experiencing distraction from stress that impacts learning (Korten et al., 2017). A purposeful sample was chosen by authors Harms et al. (2017), which aided in selecting participants and focused on those experiences of stress during the learning cycle. I obtained help from the campus administration, which secured the participants' email addresses. Sampling was purposive selection, which aligned participants with the research questions that sought to understand a type of stressed learner and their experiences (Merriam & Tisdell, 2016). Informed consent (Appendix B) from the participants transmitted the voluntary nature of their involvement in the study and explained their role in the research.

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Researcher's Positionality

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I formulated my interpretive framework and philosophical postulations in the following sections of the chapter. The research examined a social constructivist context framed from the essence of an experience gathered from participant data (Merriam & Tisdell, 2016). I explained

my ontological, epistemological, and axiological positionality within this transcendental phenomenological study. I concluded by describing my role as a researcher to disclose my personal opinions and biases.

Interpretive Framework

My goal for this research was to describe the lived experiences of stressed learners when meeting instruction during the learning cycle from a social constructivist framework (Merriam & Tisdell, 2016). This framework required that I consider social constructivism, which views the world through the participant's varied and complex perspectives and whose shared social meanings are created through society and personally lived experiences (Merriam & Tisdell, 2016). Stress can cause adverse effects on mental processing, which makes learning challenging and sometimes impossible (Sweller et al., 2019). Prior occurrences of stress could influence the processing of a new stressor, invoking memories of constructed meaning and an assumption that learning cannot occur within a stressed state of mind, thus causing the termination of new knowledge acquisition. I posed open-ended questions to elicit information from the participants regarding the stressed context in which participants described their lived experiences.

Philosophical Assumptions

The following sections outline my ontological, epistemological, and axiological assumptions. These beliefs pilot both my life and this research. My views are united with those of Husserl (1970) and his philosophy regarding phenomenology. I aligned with the possibility that participants in this study had varying values and beliefs, which required that I bracket my personal opinions to view others in an unbiased transcendental modality.

My belief systems that directed this research were born through personal experiences that shaped perceptions and situational understanding of life stressors. An individual's stress experience aligns with Husserl's (1970) concept of thoughts and emotions, determining how an individual internalizes stressful events (Neubauer, et al., 2019). My research approach developed Husserl's simplified description of the subjective experience through empathizing with participants.

Ontological Assumption

I believe that God is the author of one universal reality. God is the creator of all good things on earth and in heaven. Additionally, human beings are both the author (the heart) and subject to man's evil deeds. God uses evil deeds for His good, and He thwarts evil. My beliefs aligned with Husserl's (1970) nature of reality, which determined that all adults suffer stress. The internalized individual stress event is consciously recognized, is unique and different for everyone, and can impact the mental capacity to process information accurately and timely. EF reasoning is affected when stress affects cognitive processes (Alexander, 2019). Adults must manage life responsibilities, duties, and roles, which can collide, become entangled, are complex, and cause anxiety, emotional friction, and stress. My assumptions agree that stress from academic frustration, pressure, and conflict can reduce educational achievement (Kar, 2017). As the human instrument in this qualitative study, I know participants had varied positionality on reality (Merriam & Tisdell, 2016). Through these multiple perspectives came discoveries of themes. These themes may reveal multiple realities for participants, which may not align with my beliefs and require me to write the data using the participants' voiced descriptions of their experiences precisely as said.

Epistemological Assumption

My epistemological position agreed with Husserl's (1970) views on intuition regarding an experience that supersedes knowledge. As the human instrument, I can develop intuition into the meaning of the essence, which precedes any form of descriptive data or analysis. Descriptions of the phenomenon then proceeded. My epistemological lens reflected upon personally experienced stressors, which formed a knowledge base regarding the impact of stress on mental processing. This fact required that I separate myself from the known experience to reach the state of Husserl's unconfined thought. I aimed to be bias-free in describing the participants' experiences without my conscious thoughts impeding those (Neubauer, et al., 2019). In this qualitative research, the subjective experiences of selected participants who self-identified as having stress events may or may not have the same understanding of the impact on mental processing ability.

Axiological Assumption

In qualitative research, the reader must know the views and values of the researcher as they pertain to the study (Merriam & Tisdell, 2016). My biblical worldview aligned with the word of God on the issue that man's evil heart causes harm and hurt to myself and others, but that God uses that evil for His good. "But as for you, ye thought evil against me; but God meant it unto good, to bring to pass, as it is this day, to save many people alive" (Genesis 50:20). Evil acts can, in part, cause emotional and mental stress which are detrimental to student learning. My own experiences with childhood physical abuse and loss of learning ability stood as a testament to this understanding but required that I align with Moustakas's (1994) philosophy to bracket out my preexisting bias. The integrity of the study relied on my commitment to remain completely objective. Data collection and analysis openly sought new perspectives from the information retrieved. The data was then read and analyzed through the participants' voices to broaden an understanding of stress and learning.

Researcher's Role

As the researcher and human instrument, my role does not include a relationship with the participants. However, I am an instructor at the college. My biases are based on lived experiences with stress during learning. Those biases included an internal awareness that stress causes clouded thinking, a loss of focus, and resulted in poor academic performance. As a prior stressed student, I presumed there were other individual lived occurrences of stressed learning, so I mentally separated myself from others to find meaning in their experiences. I viewed the derived data from a transcendental position, employing empathy and an open mind as the study progressed. I viewed data collection and analysis through a discovery lens, looking for others' perspectives that may help to gain a broader understanding of the impacts of stress on learning.

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Procedures

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The procedures outlined the steps necessary to conduct this study. First, I sought the proposal's Institutional Review Board (IRB) approval (Appendix A). Once received, the following steps included securing permission from Brockhill Community College administration to contact the student population from all disciplines, including the nursing program, the science disciplines, and the math department, regarding recruitment and voluntary participation in the study (Appendix D). Then, participants signed the form and agreed to engage in the research. They were emailed an open-ended writing prompt, asked to participate in a recorded individual interview, and attended one focus group.

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Data Collection Plan

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The data collection order and methods included a writing prompt, semi-structured video-recorded Zoom individual interviews, and one Zoom video-recorded focus group (Merriam & Tisdell, 2016). This order for data collection allowed participants to be introduced and eased into

the study naturally, beginning with the open-ended writing prompt containing several questions as a low stakes means to describe individual experiences of perceived stress during learning. The individual Zoom meeting interview allowed the participant to freely express and convey their stress experience from the open-ended semi-structured questions. The focus group allowed participants to publicly articulate their experiences and hear and consider other perspectives on the stress phenomena. The questions were piloted through the recommendations of Merriam and Tisdell (2016), who stated that testing each prompt's wording, phrasing, and necessity on a friend known to suffer stress during learning was completed before participant interviews began.

I wrote memos in all phases of data collection. The purposive sampling of participants sought to find shared stressed perspectives on the phenomena affecting learning. Upon IRB approval, college students campus-wide received a recruitment email to the study (Appendix D), and those who responded were sent a writing prompt. The data collection method eliminated any selection of concurrently enrolled high school students who attended college and required parental consent. Additionally, I removed students who identified as not suffering stress experiences during the learning cycle, as the stress impact on learning was the focus. Since the stress experience cannot be replicated in any study (Merriam & Tisdell, 2016), the interview questions provoked rich descriptive details about participant experiences. These experiences enlightened ID practices, mainly as they apply to creating ED aligned to lesson tasks when students are experiencing stress (Tracey & Hutchinson, 2019). The focus group interviews discussed the research collected in the completed semi-structured interviews regarding description accuracy. Participants provided additional feedback from the described data and were allowed to comment on any perceived errors or additional meaning-making of the stress impact. The focus group data collection included a video recording and memoing during the meeting.

Each interview was transcribed and analyzed based on participant meaning and available body language descriptions, if any.

Writing Prompt

Merriam and Tisdell (2016) acknowledged using an open-ended writing prompt to allow participants to write about their lived experiences. For this study, questions were targeted to draw upon stress occurrences during learning and the respondent's perception of the impact on academic performance. The questions asked for written responses focused on identifying experiential components that impact EF and cognition. This was appropriate to differentiate stressed learners who know stress has negatively impacted academic performance. The prompt needed approval from IRB and committee members and took approximately 10 minutes for the participant to complete.

Table 1

Writing Prompt Questions

1. Describe a time during the last month you felt that learning was more or less of a stressful experience. SQ2

2. In one paragraph, explain your ability to think through completing task assignments as a stressed student. SQ1

3. Describe any clouded or stressed thoughts you have had that impacted comprehension of assignments. SQ3

4. In the last month, explain your experience with stressed thoughts that have prevented your ability to focus, reason, organize information, or to recall information. CRQ

These questions aligned participants to the study and with the research goals. They offered new perspectives on the stressed lived experience from the free and unimpeded nature of

open-ended questions. The questions were foundational to support the central and sub-questions of the study.

Individual Interviews

Semi-structured interviews were acceptable for gathering qualitative data (Merriam & Tisdell, 2016). For this phenomenological study, interviews with bracketed questions provided descriptions of students' objective reality of the stress experience and the subjective perception of the reality of that lived experience (Moustakas, 1994). Interviews were recorded using a Confer Zoom software meeting. I asked the research questions during the interviews for this data collection strategy, which took approximately 45 minutes for the participants to complete. The interview process first included some warmup questions and comments followed by a sequentially ordered list of questions to allow for less anxious responses from the participants and to discover perspectives through narrative analysis (Merriam & Tisdell, 2016). I transcribed the video audio recording using transcribing software from Confer Zoom. While reviewing the videos, memos described observations of responses and the resulting body language were taken.

Table 2

Individual Interview Questions

1. Please introduce yourself by saying your given name and student status.
2. Please tell me about your academic experiences so far.
3. How far do you intend to take your studies after community college?
4. Why is your education important to you?
5. Describe your stress experience and its impact on learning when attempting college coursework. SQ1
6. Describe your stress when you think about college coursework. SQ2

7. Describe your thinking ability during feelings of stress when attending to coursework. SQ2

8. Describe how you manage stress. SQ3

9. What type of support would help you manage stress? SQ2

10. What affects your motivation during learning? CRQ

11. How does the stress experience affect what you see or hear as you receive instruction? CRQ

12. How does stress impact your time awareness when reading course content? CRQ

13. How does stress impact your writing ability? SQ1

14. Describe the course materials that engage you during stressed learning. CRQ

15. Describe your ability to focus on learning when stressed. CRQ

16. How does stress affect your emotions when trying to learn? CRQ

17. Describe your ability to recall information when stressed during learning. CRQ

Questions one through four are open-ended warm-up questions designed to relax participants to the researcher and to reveal information about themselves. The tone and delivery of the questions set the mood for participants to express themselves freely. Question five invites the participants to describe their stress experiences from their perspective and aligns with the social constructivist framework. Questions six through 14 invited the participants to describe the impact of stress on their learning and academic performance. It was necessary to ascribe categories of stress types for ID practitioners to comprehend how vast this problem was and give support for improving design processes for lesson planning (Larson & Lockee, 2013).

Questions 15-17 asked the participants to identify what they believe are areas of mental processing deficits in their own words, which was a crucial question in many regards. First, the

question was specific and directly related to the stress experience. This correlation between stress, working memory, and EF functional deficit gave the researcher insight into participants' experiences with how stress affects them. These questions helped develop significant themes and sub-themes about the effect of stress on learning.

Focus Groups

A focus group interview allowed participants in this study to come together in one Zoom meeting to collectively share and convey ideas about the stressed learning experience (Moustakas, 1994). The focus group encouraged interaction and provoked conversation on the stress experienced during learning, offered additional verbalizations of the experiences, and refined personal views (Moustakas, 1994). These invoked comments on the relevance of ID supplemental support material to aid the stressed-out learner (Merriam & Tisdell, 2016). Interactions and group discussions were observed through a constructivist approach to data analysis (Merriam & Tisdell, 2016). The focus group meeting took approximately one hour for the participants to complete. All identifying data from the transcription was removed to retain participant confidentiality (Moustakas, 1994). The subsequent digital recording and transcription revealed different categories of stress phenomena emerging from the focus group.

Table 3

Focus Group Questions

1. What can you add to your individual interview responses about the stress experience's impact on learning? CRQ

2. Describe the type of stress experience that is most interruptive to comprehending learning materials or instructions. CRQ

3. Describe a time you received a poor grade on an assignment and knew that stress was the cause. CRQ

4. Describe which EF thought processes are most diminished by stress. SQ1

5. Describe how you mentally switch tasks when learning goals change while in a stressed state. SQ1

6. Describe your ability to store new information and recall it later when stressed out. SQ1

7. Describe a time when you mindfully completed tasks during stress-impacted learning. SQ2

8. Describe the instructional support materials that have exercised mental processing or have redirected stressed thoughts when learning. SQ2

9. Describe how course assignments, discussions, or instructions seem to you when stressed. SQ2

10. Describe your attitude towards instruction when stressed. SQ3

11. Describe how you choose to complete tasks during stressed learning. SQ3

The above questions invoked descriptions of participants' lived experiences with stress during the focus group. Question 1 was used as the icebreaker and helped participants relate and learn about each other. Questions 2 and 3 were included in the interview protocol to address the central research question and offered insight into the stress experienced during learning. Questions 4, 5, and 6 were included in the interview protocol to address Sub question one and addressed EF's ability during stressful occurrences. Questions 7, 8, and 9 were included in the interview protocol to address Sub question 2. They attempted to elicit learners' responses about content design and its effectiveness in helping during a stressed-out state of mind. Questions 10 and 11 were included in the interview protocol to address Sub question 3 and addressed emotional and attitude aspects of EF.

Data Analysis

In Moustakas's (1994) approach to phenomenology, I read and cut down descriptions into units of meaning. Then, I searched for thematic clustering and linked the data to similar units. Then, I described the discovered meaning in an iterative process while memoing reflections and summarizing the lived experiences. The resulting phenomenon presented the written essence of the research participants' lived experiences.

Analysis of the writing prompt, including transcribing participant responses, was typed into a computer file. I coded the data by assigning a mnemonic or linguistic labeling to the various labels for easy retrieval (Merriam & Tisdell, 2016). During axial coding, these were cross compared to the categories in the semi-structured interviews and focus group responses to find similarities or differences among themes (Merriam & Tisdell, 2016).

Coded categories were formed from the participants' responses during the interviews from both the semi-structured and the focus groups (Moustakas, 1994). Analysis activities included the amalgamation of coded categories from the writing prompt, and the semi-structured and focus group interviews were then combined to discover overarching themes that answered the research questions. One example identified structures by looking for significance between descriptions. Then, clustering into units of meaning and themes, worked to find thick descriptions of the structures located within the words to finish with the essence of the experience (Merriam & Tisdell, 2016). This offered a means to reduce the participants' words into compartments of constructed meaning and resulted in transcendental data units. Making inferences to create a model was conducted to describe the phenomena contextually. According to Merriam and Tisdell (2016), synthesizing data from the interviews, writing prompts, and one focus group demonstrated interconnectedness and compiled and compared using the Taguette software and a Word document with constructed tables for the transcription analysis and the

themes and categories.

After the interviews, the participant responses were transcribed into a digital file. The coded transcriptions used inductive reasoning based on similarities and differences of statements, meanings, and word groupings and assigned them to categories or themes. The coded data assigned a mnemonic or linguistic label to the various data components for easy retrieval (Merriam & Tisdell, 2016). My initial process was called *open coding*. Further analysis showed preliminary emerging themes alluding to typical participant experiences with stress during the learning cycle. Constant data comparison and following Moustaka's process allowed the phenomena to enlighten new understandings and for the descriptions to evolve. Axial coding furthered the analysis where categories of words and descriptions benefited from aggregation and clustering to discover emerging themes (Merriam & Tisdell, 2016). Selecting emergent categories represented the overall theme of the phenomenon. Intuition and the essence of the phenomenon's conditions and factors provided valuable descriptions.

Analysis of the responses during the focus group session included transcribing the digital recordings into a computer file. Coded data were assigned a mnemonic or linguistic label to the various data components for easy retrieval (Merriam & Tisdell, 2016). Open-coded transcriptions into categories or themes allowed the discovery of new participant perspectives. Comparing axial coding to the categories in the semi-structured interviews and writing prompts found similarities or differences among themes (Merriam & Tisdell, 2016).

Trustworthiness

This section outlines the study components that addressed trustworthiness. Establishing trust in qualitative research involves a set of criteria to judge its trustworthiness (Lincoln & Guba, 1985). Trustworthiness was established by providing detailed descriptions of credibility,

transferability, dependability, and confirmability (Lincoln & Guba, 1985). This overview

explains the measures to safeguard trustworthiness within this study.

Credibility

The term "data triangulation" was introduced to offer internal validity when comparing

and cross-checking data from the writing prompt, interviews, and one focus group (Merriam &

Tisdell, 2016). Through each step, participants' stress experiences from triangulated data

collection methods were described as accurately as possible. The transcriptions were reported to

the members through a focus group meeting (Merriam & Tisdell, 2016). This garners credibility

with the participants and supports their willingness to participate in the research.

There was also the issue of establishing credibility with members who worked with me.

A peer examination of the manuscript data collection methods revealed that my actions during

the study demonstrated integrity, sincerity, and believability (Merriam & Tisdell, 2016). Lincoln

and Guba (1985) stated that member checking was foundational to establishing credibility within

a qualitative study. During the focus group, participants were provided with transcriptions of the

individual interviews to verify accuracy.

Transferability

In qualitative studies, research is not generalizable. Transferability was demonstrated

using thick descriptions and may be transferable to other contexts, such as other student

populations or sites (Lincoln & Guba, 1985). Rich descriptions of research findings helped with

the concept of transferability to other research circumstances. For example, other stress

researchers seeking to consider EF deficits in their ID may gain insight into their processes by

reading the stories of others. As with all descriptions, other readers may interpret the findings

with different meanings and conclusions. They are additionally descriptive as participant-described essences to show other significances.

Dependability

Authors Lincoln and Guba (1985) stated that dependability was the scale to which another researcher could repeat the study with comparable outcomes. Thus, documenting procedures and research processes allowed for transparency and replication. Describing the setting for the study includes applying a safe and campus-authored community college Zoom call for both the semi-structured and focus group settings via the Internet. Placing this study through an inquiry audit with the committee chair, the director of qualitative research, and, in part, the members provided dependability.

Confirmability

Confirmability is the scale to which the researcher stays neutral or objective (Lincoln & Guba, 1985). Bracketing provided a means to delineate my personal experience with the stress phenomenon (Merriam & Tisdell, 2016). Bracketing included answering the study research questions personally to determine existing bias. By setting aside my bias, I learned that the described lived participant experiences were partly similar and dissimilar to my preconceptions about the impact of stress on learning based on the level of stress experienced. Additionally, I memoed after the interviews to put my observations and thoughts into words to identify any implicit biases that needed to be removed from the study. Triangulation of data sources was used to enhance credibility and confirmability.

Ethical Considerations

Concerning ethical considerations, participants were informed (Appendix B) regarding the study's goal and assured complete confidentiality with the inclusion of written pseudonyms

for all individuals and the school district (Merriam and Tisdell, 2016). The digital participant list of names and pseudonyms was stored in a password-protected document. Pseudonyms were randomly chosen from known alternate names. Participants signed an IRB-approved informed consent form (Appendix B). Physical data was stored in a locked filing cabinet, and electronic data was password protected. Physical and electronic data will be destroyed three years after the study's conclusion. This study provided minimal risk to participants and the school district. There was no specific benefit. However, participants found that the focus group offered learning more about stressed experiences from others and as a result of sharing their personal experiences with the group.

Permissions

The permission documents for certain parts of this study are included in the appendix. These included the Liberty University IRB approval letter (Appendix A) and a permission form (Appendix E) from the college administrators who approved the participant research. A consent form was also emailed to potential study participants (Appendix B).

Other Participant Protections

Participants were informed (Appendix B) that their participation in the study was voluntary and that they could withdraw at any time without penalty (Moustakas, 1994). The Zoom-recorded meetings were kept confidential, and the site was identified as Brockhill Community College. All electronic data are stored on a password-protected computer for three years and include all data collection methods, software-generated documents of themes, sub-themes, and codes, and documents created to track participant emails, gift card payments, assigned pseudonyms, transcriptions, and video recordings. The rationale for a three-year timeline allows for the potential of further research to improve ID consideration of the stressed

learning experiences on EF and academic performance. Destroying data three years from the concluded study will be completed by deleting all above-referenced materials from the computer where they are stored. There were no perceived risks to the participants. The benefits of voluntary participation were intrinsic, adding to the body of knowledge regarding stress in academic settings.

Summary

This study's qualitative phenomenological transcendental design choice aligned to foster exploration of the participant's lived experience through written and oral investigation of the stress phenomena (Merriam & Tisdell, 2016; Moustakas, 1994). Data collection methods supported the gathering of data through a writing prompt, individual interviews, and one focus group, which allowed participants to comprehensively offer objective and subjective perceptions of their stress reality (Moustakas, 1994). Data analysis strategies allowed for the clumping of themes from the thick descriptions of the participant stress experience through bracketing biases in the research questions (Moustakas, 1994) and permitted fresh perspectives on EF and cognitive processes impacting academic performance.

CHAPTER FOUR: FINDINGS

Overview

The purpose of this phenomenological study is to describe college student stress experiences that impact Executive Function (EF) and cognition at one community college in California. This chapter begins with a rich description of each participant in the study. The findings are presented as themes and sub-themes, and the outlier data was identified. The research questions, aligned with the conceptual frameworks, are answered.

Participants

Participants were selected using a recruitment letter (see Appendix D) and a link to the research published in the site newsletter. Three qualifying stipulations were included (see Appendix B) when recruiting participants who were adult students (18+), had completed at least 30 units of college learning, and experienced stress during coursework. Participants were drawn from one community college in southern California. The site administrator was given the recruitment letter (see Appendix D), a permission request letter (see Appendix E), a consent form (see Appendix B), and a writing prompt. Potential participants emailed me the signed consent form, indicated they met the three study criteria and attached the completed writing prompt. Individual interviews were scheduled and completed, as was the focus group meeting. In total, 13 stressed college students with various learning experiences participated in this study. Table 4 provides an overview of the sample participants' college backgrounds.

Table 4

College Student Participants

Student Participant	Major	Degree Goal	Gender	Year of Study
Abbey	Nursing	Masters	Female	Second year
Abigail	Physics & Environmental Studies	Bachelors	Female	Second year
Alyssa	Nursing	Doctorate	Female	Second year
David	Engineering	Bachelors	Male	Second year
Kristine	Business Management	Bachelors	Female	Third year
Lucia	Math	Masters	Female	Second year
Lupe	Nursing	Masters	Female	Second year
Mary-Grace	Nursing	Bachelors	Female	Second year
Maude	Nursing	Bachelors	Female	Second year
Monica	Psychology	Masters	Female	Second year
Rose	Nursing	Bachelors	Female	Second year
Sarah	Science	Doctorate	Female	Second year
Victoria	Psychology	Marriage & Family Therapy	Female	Fourth year

Abbey

Abbey was a full-time nursing student in her fourth semester at Brockhill Community College. Her goal was to fulfill her parent's desire to be educated in the United States, where she stated there was a better opportunity to achieve her education than in her own country. She plans

to continue her education through to the master's program and acknowledged this would take perseverance through a heavy course load each semester. She described the stressful occurrences from learning the previous academic term as the most difficult she had ever experienced. She complained that too many classes were accumulated simultaneously, and each was demanding. The learning environment in one class had high expectations of student skill performance and the ability to answer on-the-spot questions. She explained that the instructor displayed nonverbal micro-aggressive behaviors that caused Abbey to "freeze up" and become nervous about giving the wrong answer. This instructional behavior was coupled with questioning why or how she could not know the answer, which caused her to stop preparing or studying before the skill performance test. That stressed environment made her emotionally sensitive and less open to criticism. "I take things more personally, and I do not apply it to my learning the way I should." This was described as causing nervousness and uncertainty at the start of every new course and had taught her that she could not hear any further instruction after criticism. Her thoughts focused on telling herself not to become emotional and cry, and she was "more in her head" than concentrated on instruction. She expressed that she became unreceptive to learning. Stressed thoughts about coursework and a constant comparison to her peers' course load versus her own occupied her thought processes. She described those different pressure levels as grade performance, high expectations of course load, and peer judgment. At times, Abbey shared that these resulted in overwhelmed feelings and wondering whether she could meet those expectations. She explained that her thinking ability "is lost somewhere in my brain...and I can't remember it, and that in itself can be very frustrating."

Abigail

Abigail was attempting to double major in physics and environmental studies. She was a second-year student at Brockhill Community College, taking courses at a slower pace while living at home with her family and working. Her value for education provided challenge, purpose, and a desire to learn about her varied passions and interests. She was taking in-person classes, which she explained as less stressful than online learning. Abigail reported that academic support to manage her stress better was in-person time with her professors. She said using Zoom was more challenging because internet-based meetings did not offer problem-solving interaction as in-person instruction. Her motivation depended on professors who were passionate about their subjects, and she enjoyed collaborating with other students to solve problems. Abigail found that working problem sets on paper were the most engaging, rather than completing anything on her computer. She also stated that she could not watch an online lecture video and stay focused to retain information. However, when stressed, she shared that her thoughts wandered during in-person classes, and she "zones out" from hearing instruction. This also affected her time awareness, which depended upon the task. If there was a problem set to complete, she lost track of time and commented that time flew by after realizing four hours had passed. Conversely, she was time-conscious when stressed, thinking about the coursework and planning her schedule to complete activities.

Alyssa

Alyssa was aiming for an associate degree in nursing (ADN) as a student at Brockhill Community College in her third semester. She was concurrently enrolled at another university to obtain her bachelor's in nursing. She already had a bachelor's in clinical psychology from a different university and wished to pursue a master's degree in nursing and a doctoral program.

She acknowledged her love for learning and supportive educational environments. Conversely, she observed that prior unsupportive learning situations had negatively impacted her thought processes, and she had to make a concerted effort to focus on comprehension to retain information. Alyssa remembered a lived experience with academic stress when "put on the spot," being questioned in front of her peers in a laboratory environment. At that moment, she noted her inability to recall information quickly or complete tasks promptly. At the time, her college course load was stressful and caused her anxiety with all the coursework, which affected her study ability, resulting in procrastination. She noted that "stress, in an ideal situation, would be to like start my assignments early so that I'm not overwhelmed. But the reality is that that is not always the case. Sometimes it's so difficult for me to just get started that I feel like I procrastinate." Alyssa admitted that procrastination was one of her motivational coping mechanisms and affected her time awareness. Either she believed she had plenty of time to finish an assignment, or the time frame was limited, forcing a rushed learning outcome. Procrastination led to rushed written assignments, which forced her to submit rough drafts without proofreading, affecting her grade. To support higher grades and better manage stress, Alyssa complained that assignments should be spread over two weeks rather than due all in one week and then none in the next. Additionally, when instructors did not provide the materials before the lecture, she reported that it forced her to write down the information and not learn anything. Instead, She would prepare before the class and be present in the session, ready to receive instruction visually and audibly and be more relaxed. Alyssa self-identified as she suffered from anxiety and noted that stress amplified her emotions. She lost concentration and became "fidgety...and slip into negative emotions...about my own performance and self-worth...when unable to retain information." She observed that an instructional one-on-one environment would help manage stress and increase

retention because being able to "talk information out and understand" aids her comprehension. Additionally, collaborative instruction was Alyssa's most engaging learning experience. "Instead of just having someone talk *at me* in lecture, having like visual aids is helpful... combined with hearing information...with like more of a discussion type learning or a question and answer."

David

David had only one course left at Brockhill Community College before transferring to a university to pursue his bachelor's degree in engineering and perhaps obtain a professional certificate. He believed education begets knowledge, which produces power and opens doors. David stated that he intends to "take action" and help others, not just himself. His motivation to complete his education came from a life-long dream to be a professional, to prove to himself and his loved ones that he could achieve his goals. He acknowledged, however, that the semester during this study had been overwhelming, taking 17 units alongside "other lifestyle responsibilities." He struggled with structure and finding a routine for handling the course load. The resulting stress inhibited learning, and he observed having had difficulty beginning assignments, let alone completing them. Coursework, he reflected, made him feel stressed, which made him feel unproductive and tired. His approach was "just to get assignments over with." He acknowledged that stressed thoughts made processing information challenging to gain new information. David tried to manage this problem by listening to music and exercising. He commented that limited resources to buy food caused stress and frequent hunger. "I was hungry all the time, and that would make it very hard to learn. But I've learned that for me, I need to have my food ready and eat properly, so that I can maximize my learning." Stress, he reported, "makes it harder to learn because you can't really understand what they're [instructors] saying." He believed during the lecture that his hearing receptors were lost first under those stress

conditions. Losing awareness of time when completing coursework, David stated, "You'll be working on an assignment, and then the next thing you know, three hours have gone by." Not completing tasks promptly, he got emotionally frustrated, which affected his short-term memory and recall, and he could not remember new information for a couple of days or a week after learning something.

Kristine

Kristine was a returning college business management and accounting student and wanted to become a CPA. She reported that she had previously studied criminal justice and political science, including women's and gender studies, reaching junior student status. Aspiring to obtain her degree for her children and for a better job, she reported this as academic motivation. She acknowledged constant grade checking as a motivational behavior, ensuring she maintained "A's." In contrast, motivation dissipated, she stated, when instructors "dump on your doorstep" the new week's course load in Canvas, leading to question her ability to achieve learning as the "clock ticks away" at the pending due dates. The heavy amount of homework "doled out" in each class was perceived by instructors as assuming this was her only class, which caused her to calculate her degree path to take ten years to complete, likening an accounting degree to becoming a doctor. Describing the mental "spiral," she remarked about the costs of classes and forced transfer requirements, rendering past completed credits useless. The resulting self-doubt and confusion, she reported, caused her mind to cease working and close "all the tabs open in my brain." Kristine reflected that these ongoing stressors were compounded by being an older student with an aging brain, recognizing that she was mentally "struggling", and believing she was incapable when comparing her mental flexibility as a younger student. Her thinking ability during stress was described as her brain acting like a light switch that just turns off. She

acknowledged that taking a break from learning tasks was required because her thinking would "not turn back on," which "freaks her out." She was sensitive to due dates and aware of the heavy course load. Her coping skill for managing stress was reported as "escapism and distraction" in the form of using social media [TikTok] and watching junk TV shows. She believed in-person classes would better manage her stress, but working full-time during the day eliminated this option. Kristine stated that instructors do not offer much in the form of instructional support.

Lucia

Lucia was a math major planning on transferring to a four-year university in the fall semester. She considered if a master's degree would be advantageous but had no plans to continue beyond that. Motivation to make an academic degree decision was impacted by circumstances, whereby Lucia was advised to retain the math class credits or risk losing them. Even though math was easy, Lucia preferred engaging with in-person group work to help share the task burden when stressed. In contrast, with Zoom group work, her experience was that no one participated. She also preferred writing discussion posts that related to her own life. Lucia put off completing coursework when the task did not engage her, as the academic strain affected her more. The more complex the assignment, the more she procrastinated. She also considered the consequences of her grades and calculated the impact of not turning in assignments, which determined her task completion decisions. She acknowledged that she skipped over written directives, which resulted in an incorrectly completed task. She also stated that she did not properly listen to the instructions that "goes in one ear and out the other," though she heard what was said, she did not comprehend it. Lucia also shared she was a clock watcher in class when under pressure and time slowed to a grinding pace. She could not concentrate on the 1.5-hour

instructional video to take notes when learning online. Her stress increased with the perceived amount of time it would take to pause and play multiple times to take notes. She complained that her focus was distracted by the action of "play it, pause it, write it down just over and over." She had no comprehension of what the notes said during that hour and a half. Describing her stress and thinking ability about coursework, Lucia stated that her overall self-worth diminished in how she viewed her competence. In a stressed state, she reported that the thought of some coursework was "such an awful experience," Instead, she would use her phone or take on some other distraction. At other times, she would "just keep hacking at it until I finish it" while not liking the process. She got angry with herself when she could not figure something out, and her recall was also affected by stress. She described this occurring when learning constructs with math. She acknowledged that if she understood the concepts, there was less to recall. However, stress diminished her ability to remember "old stuff I learned a month ago."

Lupe

Lupe was a full-time student at Brockhill Community College. At the time of this study, she was in her third year in a nursing program. She planned to complete her associate degree and was concurrently enrolled in the summer semester to obtain her bachelor's degree. Her plans were to attempt a master's degree, and she acknowledged her love for being in school in a supportive environment. She also noted that tutoring was essential to supplement her reading and comprehension. Her preference for the type of academic support that best suited stressed learning was case studies or "real patient scenarios." She reported that reading textbooks, taking notes, or "something monotone on the screen" was ineffective, but videos were more entertaining, distracting her from the stress. Lupe described the impact of stress on focused learning as "obviously a part of your mind, and you're using your mind to learn. So, you're trying to focus on

learning and doing assignments. But then you're also overwhelmed." She reported that stress caused by course load impacted all other areas of her life responsibilities and made her feel "panicky in a way." She stated that finding enough time to complete everything and do it well was difficult. Lupe observed that her thinking ability was "a little blurred," and she had to mentally adjust when taking tests, acknowledging she "jumbled up" reading questions and had to "reread it and reread it and reread it...and was too focused and panicked on like what's gonna be the outcome of my score?" During those times, she acknowledged that information was not processed, and her exam performance was disappointing. She noted that examination stress reduced her recall ability but that she would remember the information after the test.

Lupe described physical tiredness as a factor that affected motivation during stress—her many clinical hours on campus sometimes impacted her desire to open a textbook or learn anything new willingly. Additionally, when stressed, she would "zone out and not hear anything" during a lecture because she was worried about what she needed to do in another class. She also commented on losing track of time when stressed. Her multiple stressed thoughts dominated her time awareness rather than being mentally present on the task at hand. Especially with her writing ability, which declined during stressed learning. She reported that her writing was not clear or concise, as she was more worried about completing the assignment on time. This caused feelings of emotional irritation, sadness, and becoming upset. She commented, "I let my stress and anxiety take over my brain and not let me actually think things through the way I should have."

Mary-Grace

Mary-Grace was an associate degree nursing (ADN) student at Brockhill Community College in her second year, taking a full-time course load. She acknowledged that with much

reading and practice laboratories, there was no time to fall behind or lose attention. She aspired to obtain her bachelor's degree in nursing and had started a concurrent program, which she stated would be tough but would save time and money. Education was essential to her future goals of becoming a nurse, but those goals changed her personality. Her colleagues gave feedback on her year-end performance and stated that they noticed she was not the same person from the beginning of the year. Academic stress caused her to feel "heartache," and Mary-Grace noted that the stress experienced from her coursework caused poor grade outcomes, resulting in her fixation on what she did wrong on her assignments or exams and her inability to focus on anything else. She observed that her thinking ability during stress when taking an exam was worse than usual, and she said, "I cannot relax when doing my exam, and I think that is so disturbing. When you enter the room, I feel like my heads rushed with blood, or so it's like a pressure, and your heart rate is faster." Additionally, she believed that relying on herself was the only form of academic support available. She was unaware of the counseling services the researcher mentioned after her response. Mary-Grace also noted that stress did not impact her motivation to learn other than if other students got better scores than she did. She noticed that her hearing would "drop to 5% when stressed" and that she could not take in any information and, "it's like you're present in that class, but your mind is not there." She did not feel that her time awareness during stress was impacted because, "You're always aware of time, even if you're stressed...it's like, I always need to measure my time...I always allocate time for stress...I cannot waste time." Lastly, she observed that under high stress, her recall was "very poor...with very bad short-term memory." She needed to rely on her friends as a support system to remember what was said in a lecture. Offering clarification, she said she remembered little information given in the classroom and preferred learning through YouTube videos.

Maude

Maude was in her fifth year as a college student when she was accepted into the nursing program at Brockhill Community College. She aimed to obtain her bachelor's with another online university where she was concurrently enrolled. She expected to continue approaching coursework seriously minded, wishing to increase her knowledge and display her academic strength. College learning was more intense than formative schooling. She felt stressed during the pandemic when learning was forced online, resulting in a lack of engagement with teachers, for which she pronounced a dislike. In her nursing discipline, she stated, "The stress I've been experiencing is... a lot stronger...with very high stakes here." The program only allowed two attempts at the exam for a passing grade, and students were dropped if they failed both. "It's extremely stressful to think about how messing up maybe a decimal place or missing maybe a unit for a medication could completely affect my academic journey." She recounted that she passed the first exam and failed the second due to stressful family matters that distracted her. Focusing while under stress, she worried whether new information "would stick throughout my education...and I try not to let it get to me, and I try not let it deter me away from the program." Additionally, she experienced feelings of agitation when she believed new information should be easy to comprehend but was more complex than expected. Regulating her emotions during stressed learning became important because "with nursing school, you don't have time for that," as the instructor's expectations were unreasonable for her second semester in nursing, putting too much load on her. Preparing for exams, she cited her thinking ability depended on her stress level at the time. She became uncertain about what information was the most or least important, thus affecting how thoroughly she studied and retained. Retaining information in long lectures,

Maude experienced a loss of visual and aural comprehension. When stressed, she noted that the instructor sounded like they were:

> speaking gibberish, ... I can't comprehend ...the English language to a point like it doesn't sound real at times and sometimes with the stress things just don't make sense, and it becomes overwhelming, especially if during that entire lecture that ... nothing's clicking.

Retaining information in long-term memory and her recall ability "plummets to the ground" when stressed by outside factors. She stated that her lack of recall caused her to fail an exam on the day of her interview with the researcher. She felt discouraged and had a higher level of stress due to the threat of being dropped from the program. Needing support, peer tutoring was offered in which she got more experienced perspectives on her assignments and how to approach them. Doubt in handling the course load produced stress as the course calendar" stacks up" with assignment due dates and impacted motivation. She mentioned, "It is more difficult to be motivated, because I'm not sure if I can handle the workload."

Monica

Monica was in her last semester at Brockhill Community College. Her educational experiences had been hard, having dropped out in 2015 and returned in 2018, aspiring to get her master's degree in psychology. She self-identified as having bipolar disorder but understood the importance of obtaining an education. Monica commented on her stress experiences when meeting coursework deadlines, as well as the large workload she had. She remarked that the assignments were tedious and annoying, especially when she did not understand a task or could not engage because of stress or meeting deadlines that "damper your flexibility." Monica experienced a lack of concentration and stated, "I can't obtain new knowledge in a sense like I have to reread, reread, reread and that makes it stressful for me." While managing stress, she

stated that the type of academic support that would help her would include more available tutors. When she tried to use them, the tutors were all in sessions with other students or did not help with her specific discipline. During a lecture that required using both visual and aural senses, Monica reported that "I either have to look at what I'm gonna be doing or hear what I'm gonna be doing. If you tell me both at the same time, one or the other is in and out of the ear or I'm not paying attention." She admitted to rushing through coursework when aware of time limitations. When writing, stress caused her to lose her train of thought and wander off to abstract thoughts that had nothing to do with the task and "ruined" the paper. Monica stated that stressed learning was best helped by watching instructional videos and not via "old textbooks from the twenties...or a slideshow...or it's a teacher talking...using pin pointers or lasers at the board." She acknowledged that focusing was hard for her during stressed learning, which caused her to limit the number of courses she took each semester for better success with grades. Additionally, she observed that stress caused her to feel depressed, which then affected her motivation to complete tasks and "put me down a spiral."

Rose

Rose was in her third semester as a nursing student at Brockhill Community College and concurrently enrolled in the winter and summer breaks to earn her bachelor's degree. She stated that at the beginning of school, she had been misguided and dropped classes, not knowing if nursing was in her future. However, during COVID-19, she took online science classes and applied herself, which shifted her perspective on a nursing career. She reflected that her parents encouraged her to pursue an education, and she naturally loved learning.

Rose shared the impact of stress on learning in her approach to completing assignments or learning tasks. Sometimes, stress affected what knowledge she gained from the assignments

themselves or how fast or slowly she took to complete them. She acknowledged that a stressful week affected her exam grades when "life just hits you all at once." When multiple assignments and exams collided, Rose stated that she "stress thinks" about fitting in study time, task completion, and her work. Her thoughts are "scrambled...can't concentrate...and... harder to grasp concepts." To amend this, Rose tried to stay organized using a planner or took a step back to "decompress" and spend time on non-academic things. She recognized that academic support preferences included counseling to cope with stress. She shared that those counselors connected her to resources depending on her life stressors. Visual materials Rose called "passive" offered a more engaged learning experience. She stated that listening "can easily kind of like zone out, maybe, and produce misinformation." Conversely, Rose reported that she suffered disinterest in coursework when presented poorly. She commented that some material would have been motivational if her learning style had been initiated. She observed a strange experience with stressed learning that can produce "tunnel vision," not taking everything in, and being "hyper-focused on little things" with what she could see and hear during instruction. Rose experienced time awareness as being "hyper-aware" when time limits were attached to learning or assessment activities. She stressed over how much time she had left and would rush through tasks. She hurried through written assignments, which caused her to make more grammatical errors without review before submission of the task.

Sarah

Sarah was completing her last semester at Brockhill Community College. She planned to transfer to a four-year university as a science major in the fall, with further aspirations to attend medical school. She identified as a second-generation American and stated that her education brings great satisfaction to her parents and herself. She expressed a great love for learning and

expanding knowledge. She was carrying a heavy course load and experienced stressed learning with the combined physics and chemistry homework. She described her struggle with "battling herself" over which course deserved more time or effort and for constantly diverting attention to other tasks. She called this "multitasking" between courses to arrange study time and task completion, which caused her to feel stressed. This negatively impacted her perception of stress and college coursework. Sarah emphasized the different types of assignments created stress in remembering which class required which task. She described her mind as "racing, trying to focus on too many things at once" and then "I get just zeroed in on that thing that's causing me distress." To manage the stress, Sarah listened to different movie score soundtracks when completing coursework. She reported music helped to improve her attitude towards the task at hand. Additionally, peer tutoring helped Sarah to connect with others who had strengths in areas she had weaknesses, so she enjoyed that type of academic support to cope with stress. Lastly, she commented that YouTube videos were an excellent means to support learning, lessen the pressure, and stay motivated. She reported that the study topics influenced her motivation and effort based on whether she "loved or despised" the subject. If she did not like the topic, Sarah admitted she "zoned out often" when the lecturer talked. She described that she was "mostly in my head a lot," thinking about her confused state of mind and wondering what the instructor had said. She commented that she got distracted by social media and lost complete track of time, which resulted in incomplete homework, "scary deadlines," and increased stress. She acknowledged her loss of recall when stressed, which caused her to write many notes and refer back to them constantly from lecture videos or classroom discussions. She learned to ask questions to make up for distractions.

Course materials that most engaged Sarah during stress were short lecture videos, whereas the long lectures she complained about "take forever to get through." She enjoyed it when instructors presented modules with consistent organization and laid out content, where she could see everything for the week, which helped reduce academic strain. Conversely, tension was experienced with written responses on the discussion board when she could not see other students' initial posts before submitting her own. She worried her answer would be too short, incorrect, or missing a critical component or word, and about what her peers would think of her post and writing ability. Additionally, stress caused Sarah to lose focus. She said that consequences were learned from previous loss of academic focus, and she "reeled herself back in" and placed her phone on "do not disturb." At one point in the semester, Sarah reported an emotional and "mental breakdown" with the subject of chemistry. She confided in friends, but "they're not inside my brain, seeing, you know, my brain going at a thousand percent."

Victoria

Victoria was concurrently enrolled at a university and Brockhill Community College, completing her last semester at both. She hoped to obtain a bachelor's in psychology with a minor in drug and alcohol counseling and then transfer into a marriage and family program. Education was a huge part of Victoria's life and was the means to obtain a good job and support her children as a single parent. In her last semester, she included math, which Victoria associated with the word *stress* and math together, having dropped the subject twice before, failing on the third attempt, and currently on her fourth attempt. Her first attempt at math was while taking English and political science, where she obtained As in both, but her math grade began falling, so she dropped it. Her second attempt was with a late add code, and she immediately fell behind with the makeup assignments, unable to catch up. She dropped the course with a grade of D. She

reported that she did not want to spend time figuring out a problem not knowing how to complete it, which "drains my motivation where I don't know if I'm doing this correctly, and you know, I need help." Also, stress "throws off my mindset if I'm trying to...put a paper together, or if I'm working on a math problem, I think it's mainly always something I'm not understanding." Her lack of comprehension impacted her ability to see and hear instructions from the teacher as they explained a math problem. When the instructor was writing an unfamiliar problem on the board, Victoria became confused. She said her hearing was impacted because "if I don't understand it, I kinda get sidetracked...it [hearing] just kind of declines a little bit." Victoria mentioned the need to go to the campus learning center for support because the instruction was inadequate as a stand-alone method to learn and increase her recall ability. When stressed, her mind was "in a cloud," which resulted in constant headaches in prior math classes. "As soon as I heard the word math, I'd start getting anxious and it was easy to lose focus under a stressed situation...and had to reach out to the learning center or to the professor."

Results

Examining writing prompts, individual interview transcripts, and focus group meeting transcripts provided the outcomes for this study. Interviews and the focus group were recorded and transcribed using Confer Zoom and uploaded into Taquette.org qualitative analysis software. First-cycle coding was done, deriving participant quotes through in vivo and process coding. Second-cycle coding was conducted using focused coding to consolidate the data into the themes offered in this section (Merriam & Tisdell, 2016). I presented the findings of the study, followed by answers to the research questions, which aligned with current literature on stress and academic performance, as well as the conceptual framework for the study. The four themes that emerged from this study were (a) instructional impact on learning, (b) learning needs during

stress, (c) cognitive difficulties, and (d) stress occurrences. Table 5 summarizes the themes, sub-themes, and contributing codes.

Table 5

Themes, Sub-themes, and Codes

Theme	Sub-themes	Contributing Codes
Instructional Impact on Learning	Support, Instructor Behavior	positive instructor interaction, negative instructor interaction, approachable, workload, deadlines, course material offerings, breaks in lectures with discussions, organization of course materials, cater to learning style, extended due dates, spread courseload out, collaboration opportunities, discussion design, shorter video lectures, interactive learning, counseling
Learning Needs During Stress	Learning Preferences	in-person vs. online, styles of learning, discipline support, type of course material options, flexible and inclusive learning environments, hands-on activities, laboratory practice, interactive and collaborative learning, case studies, visual learning over passive lectures, ability to vent, learning center, communicate to gain understanding
Cognitive Difficulties	Memory, Loss of Focus, Clouded Thinking	retaining information, retrieving information, distracted, mentally frozen, lack of organization, reading comprehension, confusion, misunderstanding, poor performance, zoning out, tunnel vision, mental breakdown, reduced productivity, mental fatigue, lost awareness of time, problem-solving, academic decisions, lack of motivation, time-wasting, overthinking, limited allotted study time, incomplete tasks, procrastination, poor decision-making, consequences become the motivator, completing tasks at a lower standard, clock-watching
Stress Occurrences	Impact	anxiety, anger, annoyance, panic, depression, sadness, self-doubt, pressure to complete outweighs effective learning, sensitivity to criticism, fear of appearing incompetent, loss of confidence, discouragement, competing demands on time, fear of failure

Instructional Impact on Learning

Most participants emphasized types of instructor interaction that impacted stressed learning, being found across all three data collection forms and mentioned 132 times. Although the type of communication mentioned was varied, Abbey expressed that a professor's approach to instruction could "make or break" the class learning environment. Both she and Maude described increased anxiety with negative instructor interaction. Abbey's response to those encounters was lost confidence in learning, a developed fear of failure, reduced productivity and believed the instructor was unapproachable. Maude objected to the unreasonable workload, which influenced poor academic decisions. Conversely, Sarah and two other participants mentioned experiencing decreased stress when teachers presented organized weekly course modules with consistent content and expectations.

Support

The sub-theme for support was found in the codes 25 times across the three data collection methods in vivo quotes, and all indicated that help was given during stressed learning. Lupe stated she needed discipline support, and Monica expressed frustration with reading comprehension and retention, "When I'm overwhelmed, I usually like to chat with the professor to make sure what I read is what I'm understanding for an assignment..." Sarah recognized her need for collaborative support and the ability to vent, as did Mary-Grace, who repeated that sentiment during the focus group, "We need to have a good support system because we are under high stress, and our ability to recall information is so bad." Victoria stated that she had identified stressed thoughts and acknowledged that counselors helped talk with her about the stressful experience, offering guidance to the stressed student. Abbey noted that instructors needed to show more empathy and understanding for students' stressed experiences by using words of

encouragement and positive reinforcement. She observed this would make for a less stressful learning environment, motivating her to focus on learning.

Instructor Behavior

Negative and positive instructor behavior were inferred and bluntly expressed across all three data collection types, appearing 107 times. Themes of learner preferences, cognitive difficulties, and stress occurrences revealed the subtheme of instructor behavior. David complained that his existing stress was magnified by an instructor who was not "approachable.", which had greater significance in an academic performance-based class like public speaking. Abbey shared that her laboratory instructor:

> Makes it a very stressful environment, because if you miss one question or you don't answer something she's [instructor] trying to ask you she'll kind of just like roll her eyes at you and be like, "How do you not know that? Why, don't you know this?"

Maude shared difficulties with an instructor who had unreasonable performance expectations and workload, "...it has been very stressful so far, and this semester is just barely started."

Conversely, Lucia had an empathetic instructor who understood that students had final exams at the end of the week, and the instructor said, "I'll give you two extra days for it to be on a Tuesday, because I know everyone's gonna put your due dates to be on that Sunday.' That helps so immensely." Abigail reflected that positive instructor behavior influenced her response to learning by stating, "That's something that I've noticed. My math professor is very, very passionate, and it motivates me to participate in class." David reported that instructors who offered course materials, like instructional YouTube videos, allowed for pausing and adjusting play speed, helping pace his learning. If captions were included, he highlighted the main points using colors, and this helped to increase retention.

Learning Needs During Stress

Student stress episodes were influenced by various learning environments, which resulted in heightened awareness of individual needs. Participants mentioned these needs across all three data collection types, including the sub-theme learning preferences from in-person versus online codes, learning styles, type of course material options, hands-on activities, laboratory practice, interactive and collaborative learning, case studies, and visual learning over passive lectures. Kristine stated:

> I just really wish I could take my classes in person...so I could just ask like a quick question, and then I can move on with learning, whereas, like, now, I can't ask those questions. I get stuck. So, then I go to Google to like, find the answer. And then I fall down a Google rabbit hole of Bigfoot.

Learning Preferences

In total, codes appeared 90 times in participant writing prompts, interview transcripts, and the focus group, except codes for discipline support, hands-on activities, and the ability to vent, appearing only in the individual interviews. One example of a student learning preference was offered by Alyssa, who shared this:

> So, there's times where our professors won't like provide us with any materials ahead of the class. So, I don't really know what to expect. And I spend so much time writing the information down that I'm not actually learning anything, and then I have to go back and reteach it to myself in a way that makes sense to me, instead of being able to actually be present in the class and receiving instruction.

Cognitive Difficulties

Elements of the cognitive difficulties theme appeared across all three participant data

sources. Participants mentioned experiencing difficulties with sub-themes for memory, focus and clouded thinking due to stressed episodes. Significantly, retaining information was mentioned 54 times, with lack of motivation and limited allotted study time mentioned 38 times each, followed closely by misunderstanding information (31) and distraction (28). Organized thoughts with written assignments were problematic for Abigail, causing her to jump around the different parts and then "mend it all together."

Memory

Codes for sub-themed memory appeared 113 times in participant data collected from all methods. Participants shared impaired memory experiences during stressed episodes. Mary-Grace admitted, "I have a very poor ability to recall information. Very bad short-term memory too. If it's in stress, I can't rely on myself. ... I will just reach out to my friends to remind ... me what the professor said today we need to do." Abbey lost focus when stressed, commenting that her retention and recall diminished, having to "Try twice as hard to learn something" and forcing her to reread the material. Lastly, Abigail observed a stressful experience in class where the instructor mentioned something from several days ago, and she could not recall it. She commented that even when she took notes on the subject, she still could not remember that specific information.

Focus

The codes for the sub-theme focus appeared 80 times and were mentioned across all participant data collection types. Abbey shared, "I find it really hard to focus when I'm stressed ...but it feels like it's lost somewhere in my brain. And I'm like I can't remember it. And that in itself can be very frustrating." Abigail described her loss of focus:

I'm taking math and physics in person, and sometimes. When I'm stressed, I will notice

my thoughts start to wander, and ... not listen to the instruction as much, or the lecturing

... it does sort of feel like I'm not hearing what's being taught, because I'm thinking about

... stuff I need to get done.

Alyssa mentioned that stress impacted her focus and made it difficult to pay attention to the one thing she was looking at. She had to reread the information and take a few moments to comprehend what was presented.

Clouded Thinking

The sub-themes of memory and focus were clustered to form the sub-theme clouded thinking, which appeared 190 times and was mentioned across all participant data collection types. Maude provided an example of clouded thinking:

I feel like my thinking ability was foggy...because I was so stressed about what

information is going to be most important, what information is least important, and what

sort of questions my professors could ask...it definitely impacted how well I could study

like how thorough my study was and I feel like it also affected just how much I was able

to retain in the end.

Stress Occurrences

Elements of stress occurrences appeared across all three sources of data for every participant. Stressors either existed before the academic environment or were influenced by learning. Participants mentioned experiences of stress 123 times as present during learning. Some participants stated that a total learning loss resulted if both became cumulative. In the writing prompt, Mary-Grace reported a stressful experience caused by her learning environment. She wrote:

The organization and structure...of my classes...assignment deadlines. ... is very flexible

but lack the structure for me to decide when to start completing assignments. Organizing information is essential to my learning and study habits, so I feel as though the stress I am feeling relating to this course has impacted my regular study flow in a negative way.

Impact

All codes in this section were clustered to form the sub-theme of impact. These codes appeared 123 times in participant writing prompts, interviews, and focus group transcripts. The feeling of being overwhelmed was most common, mentioned 41 times throughout. Alyssa stated, "Earlier this week, I was so stressed out by the amount of material I was expected to memorize and implement in the clinical setting that the learning experience became overwhelming, anxiety-inducing, and unproductive."

Outlier Data and Findings

One participant specifically qualified as an outlier in this study, offering a few bewildering findings that were not aligned with some of the themes or research questions presented here. Monica self-identified that she had bipolar disorder, and she could not differentiate between anxiety caused by the condition or stress from academic or other sources. Some of Monica's statements did align with data collected from other research participants and answered the study's research questions. However, as a response to the CRQ, she offered this, "I am bipolar, so my mind runs a mile a minute, although I am organized, I often times don't know where to start like I have ideas that make no sense! Even off topic!" When asked if learning was a stressful experience in answer to SQ2, she stated, "Learning has been less of a stressor because I know what workload I can handle; I know how to manage my time, and I use resources available to be successful in each class." Conversely, she then offered in response to SQ1, "The workload alone makes me stressed, but when I sit down and start doing through the assignments,

I seem to get them done pretty quickly as long as I take breaks every hour."

Research Question Responses

The research questions were crafted according to the current literature and the conceptual framework surrounding stress and EF deficits during learning. The research questions were addressed using the data collected from participants through writing prompts, individual interviews, and a focus group meeting.

Central Research Question

The central research question asked: What was the lived experience of stressed college students suffering executive function deficits as they attempt to learn content from instructional design? Every participant expressed decreased EF from stressors that impacted comprehension, motivation, performance, and their quality of interaction with learning course content. Nine of the 13 participants described their learning environments as having a significant effect on academic outcomes. They reported that instructors and course material affected their ability to process new information. Abbey stated:

He's [instructor] sympathizing with us like that actually makes the learning environment feel much less stressful, and... like I feel more ready to learn when I compare it to maybe last semester where the instructor made the environment not as welcoming.

Maude offered her experience by stating, "And if I'm under more stress, or I feel like I'm being negatively impacted by ... my instructor. It feels like time is ... at a halt. So, it greatly depends on just the environment that I'm in." Participants described instructional encouragement, positivity, and willingness to provide examples during stressed episodes as beneficial. Abbey offered, "I guess positive reinforcement from my instructors is what motivates me."

Sub-Question One

The first sub-question inquired: What mental processing challenges does a student experience caused by stress when attending to coursework? The themes that informed this sub-question were cognitive difficulties and stress occurrences. Every participant expressed processing deficits described as the inability to learn new information, lack of organization, focus, retention, and recall. David shared, "I won't be able to recall information because when I'm learning while I'm stressed, then it's just memorization, it's not really understanding the concepts fully." Organizing, attention, and working memory, which include the ability to recall, are part of EF and cognition (Banich, 2009).

Sub-Question Two

The second sub-question asked: What meaning do stressed college students ascribe to how coursework was designed? The themes of instructor impact on learning and cognitive difficulties answered this question. Participants addressed the large number of assignments, quizzes, recorded lectures, projects, discussions, course material options, and organization of materials that impacted stressed learning. These were described as combined workloads from all courses that caused stress responses in various ways. Maude stated:

> But I feel like it just depends on how like the course calendar kind of stacks up. ...there's more to do with classes and ... more difficult to be motivated because I'm not sure if I can handle the workload, and I'm not sure if I can dedicate enough time to like studying and completing assignments that need be done.

Sub-Question Three

The third sub-question queried: What cognitive decisions do stressed-out college students make when faced with complex learning coursework? The themes of cognitive difficulties and instructional impact on learning answered this question. Participants shared their difficulty with

critical thinking and decision-making when learning complicated coursework. Stressed experiences for some students caused the inability to reason, judge, make sense of, or use logic when confronted with new concepts or knowledge. Lupe shared her thoughts, "I think it's probably because being stressed, you're just, you're not able to fully think." Rose stated that, "My thoughts feel more scrambled. I feel as though I can't concentrate...and it's kind of almost harder for me to grasp concepts. It takes me longer to like fully understand what I'm trying to learn."

Summary

In this chapter, the researcher analyzed the stressed lived experiences of college students suffering EF deficits during learning at a Southern California community college. A rich, thick description of each participant was provided. Four themes emerged from this study: (a) instructional impact on learning, (b) learning needs, (c) cognitive deficits, and (d) stress occurrences. Using the data collected from the writing prompt, individual interviews, and one focus group, the researcher answered the central research question and three sub-questions.

Of significance, participants emphasized an increased need for all types of academic support during stressed learning. Still, they were more weighted down by poorly designed assignments, instructional disorganization, perceived negative instructor behavior, and teaching methods than at any other time. Whether the source of stress was personal, work-related, or academic, the instructional dynamic increased strain and had a cumulative stress effect at the point of learning, which caused a breakdown for some participants. Others described either "mentally freezing" or a complete loss of learning. One outlier was noted when the participant could not distinguish between stress and anxiety, born from a bipolar condition.

CHAPTER FIVE: CONCLUSION

Overview

The purpose of this transcendental phenomenological study is to describe college student stress experiences that impact executive function (EF) and cognition at one community college in California. Stressed students shared their experiences of EF deficits at the point of instruction and learning through a writing prompt, interviews, and focus group meeting to inform an understanding of the stress phenomena. Ideas and illuminations of the data collected from chapter four and the resulting themes are expressed. The overview critically discusses the study's findings and conceptual and academic literature. Further, implications for policy and practice are presented based on the conceptual framework and existing literature, and the theoretical and methodological implications are addressed. The chapter concludes with a discourse on the limitations and delimitations of the study and offers recommendations for future research.

Discussion

Conditions where stressed learning affects EF have been the subject of research in higher education (García-Campos et al., 2020; Rahdar & Galvan, 2014). Instructional designers need more insight into how using the EF framework and stress considerations could provide a greater understanding of student learning experiences. This section includes discussion, observations, and implications of the findings of this research to help illuminate the experiences that stressed college students go through. Thorough interpretations of the raw data collected provide a clearer picture of the stress phenomenon.

Summary of Thematic Findings

The codes derived from the three sets of data collection were amalgamated into four themes: (a) instructional impact on learning, (b) learning needs during stress, (c) cognitive

difficulties, and (d) stress occurrences. These themes informed the critical discussion on EF and cognitive processes at the point where students meet ID and learn. The findings from the four themes provide novel perspectives on stress and EF deficits for college students as they attempted to learn. These themes formed a more comprehensive perspective, as students expressed that stress, no matter the source, was a frequent companion throughout their college experiences. Researchers have discussed that younger adults' stress levels are increasing, and they have greater responsiveness to stress than older adults (Robotham & Julian, 2006). Participant responses supported those literature findings. Learners described struggles with various stress levels connected to the type or style of instruction presented, the instructional delivery methods deployed, and the design of course materials. All three stress-induced instructions were described to have a significant effect on information processing, which, for some students, caused confusion, feeling overwhelmed, produced frustration, decreased motivation to learn, and resulted in poor academic decision-making. These findings support the literature that stated ID should not induce cognitive distress with poorly designed critical skills acquisition (Larson & Lockee, 2013; Sweller et al., 2019). Some students described the need to adjust their study techniques to remedy impediments to learning. Others shared that these experiences resulted in self-doubt and a lack of confidence in the student's ability to cope or handle academic demands with the compounding pressure to achieve their goals. These participant observations support existing literature, which found that information processing can cloud the perception through learner anxiousness, self-awareness regarding the ability to learn, and self-doubt (Robbins et al., 2006; Zimmerman & Schunk, 2001).

Critical Discussion of Findings

After researching the stressed occurrences of college students suffering EF deficits when

learning, four significant themes appeared, which informed four critical findings of learners'

overall experiences. The titles for these key findings are Collaborative Emphasis Course Design,

Workload-Assessed Course Design and Counseling, Learner-Paced Sensory-Channel Course

Design, and EF Learning Support Course Design. These provide empathetic perspectives,

insights, and considerations for ID resulting from this research inquiry.

Collaborative Emphasis Course Design

Overlapping themes of learning needs, cognitive difficulties, and the sub-theme

instructional support from the theme instructional impact on learning prompted this critical

discussion on collaborative emphasis course design. Opportunities for interaction designed into

instruction could direct collectively gained information and drive toward a shared goal (Plass &

Kalyuga, 2019; Ryan & Deci, 2020). Stressed students who self-regulate learning through social

experiences described an increased need for collaborative opportunities when studying both in an

online-only environment and for in-person classes. When on campus, students who experience

EF deficits that negatively affected learning shared the need for increased personal interaction

methods with peers and the instructor. Instructor support could include teaching various

approaches to complete tasks and mentoring through self-reflection discussions to improve

academic performance (Zimmerman, 2002). Students experiencing EF difficulties should lead

instruction to discover and implement ways to increase student learning outcomes (Kui, 2021;

Xie, 2021). Implementing collaborative emphasis into course design would offer a built-in

chance for those students struggling with stress, EF deficits, and coursework to have time and

space to receive clarity. Perhaps a time and space to receive clarity can be designed as the last

part of the lecture or class allotted time and would increase instructor awareness of a student's

course interaction. Collaborative emphasized in-person experiences are not typically *built in*to

weekly course meetings and were predominantly lacking in online delivery methods. A lack of collaborative emphasis is evidenced when the ID was focused only on delivering instructional materials that outline written goals, objectives, and outcomes. However, it forgot that human connections should be integral to learning. Specifically, in this study, online social experiences can be considered between instructor and student and student-to-student, which are deemed efficient by higher educational districts if provided in the form of written class discussions and instructor grading feedback. Alternatively, there can be instructor-recorded video lectures and email communication, which, to struggling students in this study, was not considered a social experience. Kristine pointed out that her online learning experience limits her ability to physically ask questions when they arise, which causes her frustration. In addition, she must coordinate time with instructors, which adds additional stress. Social experiences could be offered through a digital app that connects people as an accepted form of socializing and is assigned as part of the online course.

Two versions of Brockhill Community College's online courses, known as online anytime and online real-time, offer internet-based instructional Zoom meeting times of either a half hour or one hour (instructor courseload dependent) every week. The professor determines the meeting time and calendar, which may or may not suit the student's online learning schedule, with the online anytime as optional and online real-time as mandatory. The latter could be instructionally designed in a way akin to the in-person classes. Online anytime course design would need to include a mandatory orientation survey addressing student learning needs and then be actioned immediately into the course by the instructor (Larson & Lockee, 2013). The highlight here was that ID, whether as an instructor or instructional designer, should consider (perhaps with an acronym identifier of CE) offering collaborative emphasized courses structured

to benefit the stressed learner suffering from EF deficits.

Workload-Assessed Course Design and Counseling

The themes of stress occurrences, cognitive difficulties, and sub-theme instructional behavior from the theme instructional impact on learning prompted a critical discussion around workload-assessed course design and counseling services. In this study, several stressful experiences expressed by college students were caused by instructional behavior. Both instructional teaching practices and course material offerings characterized instructional behavior. Course materials discussed in this study included instructor-produced assignments, exams, practice lab skills, oral assessments, and assigned textbook readings. Existing research has stated that performance instruments, standardized exams, and grading provisors do not consider the basic learning needs of students (Ryan & Deci, 2020). Maude described the enormity of her classes and course materials that was causing a lack of motivation, as she was uncertain if she could handle the workload, have enough weekly study time, and complete all of the assignments. Maude offered one example: she acknowledged that her chosen degree was "high stakes" in the nursing program through the courses offered. Proficiency and performance-based exams in this discipline were described as causing high levels of student stress due to a twice-fail drop policy from the program. The magnitude of reading and assignments were another primary source of stress occurrences, along with instructional expectations for student performance. Negative instructor behavior toward learning outcomes was also noted, which supported related literature (Szulewski et al., 2020). Some students observed these as "unreasonable" and with significantly noted adverse effects on EF. Some participants expressed that they experienced a compounding impact of stress to such an extent that they "mentally froze" or "shut down," and all learning stopped. Interventions are necessary to bring extreme

stress experiences to a normalized academic expectation from a course design perspective. Instructional designers can offer students course surveys that use a combination of Likert scale and open-ended questions regarding course difficulty, heavy or light assigned reading and assignments, and test study time requirements for major exams to assess individual course workload. This information can then be utilized by counselors when planning educational course mapping with known subjects considered as "high stakes" to bring to a levelized workload burden. Additionally, instructional designers could ensure that per-course credit or unit measures for each class meet the correct academic standards for student learning.

Learner-Paced Sensory-Channel Course Design

All four themes for stress occurrences, cognitive difficulties, instructional impact on learning, and learning preferences prompted a critical discussion around learner-paced sensory-channel course design. Instructors who are flexible regarding course design in that they do not require an in-person or online lecture element could benefit students under learning duress by offering separated sensory-channel instructional technology. Existing literature affirms that ID should not mentally tax (limited capacity) visual and aural channels, which split student attention from utilizing working memory and focus, resulting in a loss of comprehension of materials (Kalyuga et al., 1999; Mayer & Sims, 1994). During stress occurrences, students described the loss of their aural channel as the first of the sensors to overload, especially during in-person lectures and with online instructional videos. As an older student returning to college, Kristine shared her online experience with an instructional video of staring blankly at the screen and hearing the sound of the instructor speaking but not comprehending what was being said. She described the experience as nothing was entering her mind because there was simply too much information presented, and she said her mind shut down. Kristine's stressed learning experience

demonstrated that sensory-channel information processing could be disrupted even without

distractions. If stress is present, and to increase self-regulated learning, instructional videos could

offer visual imagery and textual content or aural recorded material where learners use one

sensory channel at a time. Conversely, if two sensory channels' working memory stores are

initiated through course material, a self-paced design feature could help students better handle

stressed learning. This could easily be implemented, as explained in the following example. An

assignment can have multiple tabs that allow access to different materials to support the learning

outcomes. The landing page would be reserved to instruct written goals, objectives, and

outcomes, as is typically used in design (Larson & Lockee, 2013). The second tab could contain

a video or slide demonstration with textual descriptions but no audio. The third could include an

audio file with verbal instructions and offer a pull-down menu showing the transcript, similar to

research posing graphical images with spoken instruction to increase learner performance

(Ginns, 2005). Separating these could benefit working memory from increased short-term

storage (Sharit & Czaja, 2020). A tabular system frees up on-screen space, making it less

visually complicated for the stressed learner. Tab labels could identify visual and aural

instructional learning options. Annotated interaction with materials uploaded using PDF, Word

documents, PowerPoint slides, or images while following the same rubric with specific prompts

could offer learners a choice in how they complete the assignment. These options would appeal

to a learner's preferences in how students' study during stressful occurrences.

EF Learning Support Course Design

Three themes for cognitive difficulties, instructor impact on learning, and stress

occurrences overlapped to offer a critical finding discussion regarding EF deficits. Those deficits

are defined as part of cognition, including weakened working memory (Banich, 2009; Gratton et

al., 2017), attention, sequencing, organizing information, and inhibition (Banich, 2009).

Research has affirmed that adult students can suffer recall decline and controlling inhibition

(Miyake & Friedman, 2012), the ability to retain new information (Sharit & Czaja, 2020), and a

struggle to focus (Malenczak & Nemec, 2017). Research showed that participant experiences

with anxiety affect working memory and the ability to update learned information (Bredemeier

& Berenbaum, 2013). As a means of support, Mary-Grace reported that because she

acknowledged high-stress learning conditions, which caused her short-term memory to fail, she

had to rely on contacting classmates to understand the in-person class instructions. Another

student suffered information processing challenges to self-regulate. Self-regulation means that a

student has self-awareness and self-perception and will monitor the physical and social

environment around them in any given learning situation (Zimmerman & Schunk, 2001). Abbey

described her stressed learning environment as causing clouded thinking and self-consciousness

of judgment, making a loss of control of inhibition easier, including becoming emotional,

resulting in a lost learning opportunity with the instructor. The frequency of EF deficits, as

illuminated in Chapter Four's sub-theme titled clouded thinking, described 190 times by

participants, indicated the need for instructional support. Instructional support can be easily

deployed through course design and to consider the design layout of learning outcomes. The

page should use a tabular system to store and present additional supporting material to avoid

increasing the cognitive burden. A tab labeled *memory prompt* could include the lecture's main

points covered in the classroom, accommodating short-term memory and recall lapses. To aid

retention, another tab labeled *retention activity* could consist of a document that describes known

information on the lecture topic and then adds new information below but with the annotation

tool embedded to allow learner interaction, for example, to compare and contrast, organize, or

sequence new information with old, and write those observations in the margins. The action of writing assists with retention ability. Additionally, encouraging talking out loud when answering simple questions in GIF graphical format or video recorded instructor questions can aid retention for those learner preferences who need aural instruction. Designed support content should align directly with the assignment and offer clear labeling so that students can pick and choose when their need arises.

Implications for Policy or Practice

Instructional designers, instructors, policymakers, and administrators who seek to advance course design to improve student learning outcomes can benefit from the lived experiences of stressed college students in southern California. Practically, ID and teachers seeking to advance course design through the iterative component of the ADDIE process can glean much from the failed learning outcomes of stressed college students in this study. There was limited research on students stressed and emotional learning experiences from an ID perspective (Tracey & Hutchinson, 2019). These researchers advocated for further topic exploration to expand the understanding of the instructional designer and build course materials and practice methods that accommodate emotional impacts on learning. Identifying instructional interventions that promote the learner's ability to handle stress conditions effectively becomes vital to the ID practice (Sweller et al., 2019). Research has shown that self-directed learning can predetermine academic stress and motivation (Heo & Han, 2018), show a correlation between academic stress and academic performance (Kar, 2017), and increase stress factors associated with course load (Rafidah et al., 2009). While the findings of this research do not prove best practices, they do, however, reflect the current reality of stressed student experiences with EF deficits as a framework for making ID decisions in the field and thus have implications for policy

and practice, with theoretical and empirical significance.

Implications for Policy

These findings may have possible implications for higher-education school districts and instructional designers who consider their organizational policies as *student-focused* and who concern themselves with, among other things, fostering critical thinking skills, achieving successful student learning outcomes, and offering programs toward the attainment of professional employment. These goals depend upon, in part, course design that meets the learning needs of the students. Therefore, learning preferences may receive higher consideration for instruction in disciplines deemed high stakes in the job market, such as medicine. This is not to discount other disciplines, where participants in this study experienced stressed learning and demonstrated a need for increased academic support. Therefore, for ID to be prudent and part of a student-centered institutional policy, institutions should accommodate the critical finding that stressed learning conditions frequently affect student learning outcomes. These implications suggest that higher educational districts provide professional development for instructors who design their course materials but perhaps do not understand the stress impacts on student EF and cognitive processes at the learning point.

Implications for Practice

Limited research in recent years has looked at the advancement of instruction while considering both the stress impact and student academic performance (Arditte et al., 2018; Margolin & Vickerman, 2007; Rafidah et al., 2009; Xie et al., 2020). The findings from this study suggest that the current instructional course design does not adapt well to stressed adult learning conditions, which indicates a benefit to implementing alternative ID strategies to mitigate students' loss of comprehension and engagement. Increased support mechanisms for EF

difficulties may be achieved through the well-documented ID survey instrument (Larson & Lockee, 2013; Merriam & Tisdell, 2016). Additionally, and of particular interest, was establishing a closer understanding of student needs through voluntary survey profiling, enabling students to self-identify with certain stress conditions, identify the instructional impact on learning, and acknowledge cognitive difficulties with their individual courses. ID and counseling services may benefit from an interactional relationship and action research that promotes student success from the beginning to the end of matriculation (Merriam & Tisdell, 2016).

Empirical and Theoretical Implications

Previous research, combined with the themes of instructor impact on learning, learner preferences, cognitive difficulties, and stress occurrences, corroborated and diverged with the conceptual framework and literature in Chapter Two. While much of the literature aligned with the findings, the three cases of divergence where unexpected results were produced are interesting. These were found in educational goal achievement impacted by instructional expectations, which had a negative effect; repeated practice to improve recall and retention while under stress caused frustration for the learner, including that negative self-talk would destress a stressful encounter was not supported.

Empirical Implications

The theme of instructor impact on learning was observed in several ways in the related literature. Empirically, this study was similar to other qualitative studies that described the experiences of students attempting recall and short and long-term retention, explaining how learners encounter instructors who differ in their teaching approaches (Malenczak & Nemec, 2017; Tadesse et al., 2021; van Merriënboer & Kirschner, 2018). Faculty work independently from each other, which means that even while in the same discipline, foundational concepts are

not always scaffolded to new learning or built upon introductory constructs. Participants recounted experiences of uncertainty at the beginning of every semester's latest encounter with a teacher and did not know what teaching approaches or styles to expect. Additionally, included in the literature review was existing research focused on recall activities that promote and shape learning behavior with a direct impact on academic performance, translating to skills attained for success in the workplace (Tadesse et al., 2021). Other research showed instructional approaches to promote long-term retrieval ability to analyze through rationalization methods assessment, problem-solving solutions, and decision-making. Instructional support increases skill in these areas (Malenczak & Nemec, 2017; Tadesse et al., 2021; van Merriënboer & Kirschner, 2018). However, unlike these studies, this research observed recall ability and academic achievement as part of a factor underlying the stress occurrence, and negative instructional interaction approaches decreased skills in problem-solving, reasoning, and decision-making.

Empirical research supported layered ID support, which provided novice to advanced learners with customizable learning pathways (Vasquez & Marino, 2021). Through repeated practice with tasks using comprehensive learning instruction, ID can decrease support as the learner's novice EF skill improves and can increase ID performance expectations while directing the student with reduced instruction. Similar ID research included a *disappearing support* instructional method, promoting one design over the need for individual modules for novice to expert pupils (Sentz et al., 2019). Conversely, while this study identified some existence of autonomous instructional direction, participants complained that coursework was fast paced with no time for repeated rehearsal except for performance assessments that determined program removal or continuance. Additionally, participants did not recount experiences with EF testing or practice exercises, as was found in ID research, with the focus on aiding student self-awareness

of learning weaknesses and ability to attain their academic goals (Feldon et al., 2019; Marino et al., 2020; Skuballa et al., 2018). However, student mastery level measured from an instructional perspective was provided to study participants through varied course materials and formal and summative assessment methods, as was described in other research (van Merriënboer et al., 2003; Vasquez & Marino, 2021). Some participants described these instructional methods as stressful experiences due to the high risk of failing in the program.

The theme of learner preferences was observed in existing research, which addressed student needs from an ID perspective. One study supported how course materials were displayed in online environments, lacking accessibility that impeded learner preference for audible supports (Xie et al., 2019b). Participants in this research did not address accessibility as an embedded form of learning support or perhaps was not recognized as a barrier to learning. Research in support of learning solutions in educational goal achievement resolved the assessment of learning gaps and the distance from instructional expectations (Perry et al., 2020). In alignment with this research, participants were aware of instructional performance expectations; however, the literature delineated this through normal learning conditions, whereas students perceived those negatively through a stressed lens, which diverged from the literature. Existing literature also focused on improved EF skills for conceptual comprehension or technical skills, considering learner needs focused on mastery level and offering tiered instructional support. Performance levels with improved EF skills meant students could self-identify to move through mastery stages (Vasquez & Marino, 2021). Participants in this study complained that competency-based mastery level expectations were unfairly stacked from semester to semester, with no choice for self-paced learning or consideration for stress frequency that interrupted scholarship.

The theme of learner preferences was observed in existing research, which addressed cognitive difficulties in an elementary EF-focused program that supported goal setting, sequencing, and organizing with repeated examined progress (Vostal & Mrachko, 2021). Task-switching included controlled EF processes of working memory, including task selection, management of goals, and cognitive task transfer, with close movement between switching tasks increasing after training (Karbach & Kray, 2009). This task switching was observed in participant observations in the nursing program where changing course or stopping one task to switch to another during patient care happened as emergencies dictated. Working memory research proposed that poor recall may be due to a lack of practice. Research posited that retrieval exercises aid long-term retention. Working memory practice built into course design, engaging learners in a succession of student responses, would assist with inattention and increase recall (Malenczak & Nemec, 2017). While student participants reported poor recall and long-term retention, this study diverged from existing literature where stress's impact impeded repeated practice.

The theme stress occurrences with the theory and literature in Chapter Two were compared and contrasted to look for divergence or alignment. The development and protection of EF from impediments like physical abuse, for example, were advocated in several studies (Cowell et al., 2015; Ramos-Galarza et al., 2019). Research that delved into the harsh disruptions to EF proposed that stress threats adversely impact the growth in children of the prefrontal cortex, persisting through adulthood (Cowell et al., 2015; Gould et al., 2012). Participant's stress responses did not confirm or reject this research. Research on stress threat alleviation suggested that there are effective strategies for coping, including problem-focused approaches to eliminate the hindrance (Zeidner & Matthews, 2018). A few student participants acknowledged using

strategies to mitigate cumulative stress, such as distraction methods, refresher periods away from the cause of stress, and seeking familial or friendship support. Additionally, specific experiences of emotion-focused supervision to maintain steadiness could be achieved through uttering negative self-talk to ease the stressful environment (Zeidner & Matthews, 2018). Some research participants discussed this strategy while in a stressed state of mind. However, they did not report that this remedied the stress occurrence but offered divergent inferences of increased stress levels.

Theoretical Implications

Theoretical implications are drawn from the conceptual framework of cognition and EF (Banich, 2009). The themes of cognitive difficulties and instructional impact are aligned with working memory, motivation, self-regulation, inhibition, and focus as part of EF components of information processing that directly affect learner experiences with ID. Anxiety and worry affect working memory, diminishing task achievement and inability to update long-term memory with memorized knowledge (Bredemeier & Berenbaum, 2013). Lack of consideration of the student's characteristics, such as attitude or frame of mind, can cause ID to fail (Branch & Dousay, 2015; Larson & Lockee, 2013). Data could be collected for learners suffering from learning challenges, then analyzed, and developed into a learner profile on which to base ID decisions (Larson & Lockee, 2013).

The themes of stress occurrences, cognitive difficulties, and learning needs informed aspects of the self-regulated learning components in the constructivist method and information processing used to gain new knowledge, including self-initiated goals toward learning and maintaining emotions (Zimmerman & Schunk, 2001). All participants expressed their desire to earn college degrees, sought academic support in some form to improve learning, and asked

peers or family for emotional support. Lucia observed that obtaining a math degree would bring her public acknowledgment of her intellect as a female skilled in math. She stated that this was her biggest motivation to continue in the math discipline. Lupe noted that financial aid and tutoring were crucial forms of academic support to manage stress. With these in place, her focus does not have to be on where to find the money to pay for college. Mary-Grace shared that she expressed her emotions to others around her, which she labeled as *venting*, to maintain equilibrium. Student self-awareness and utilizing strategies to learn, perform, and complete tasks were essential to learning success (Zimmerman, 2002; Zimmerman & Schunk, 2001). Participant descriptions of learning experiences included self-perception of abilities and weaknesses that impacted learning outcomes. Self-doubt and anxiety can diminish clarity of thought for information processing, including self-consciousness about the ability to learn (Zimmerman & Schunk, 2001; Robbins et al., 2006). Many participants expressed some form of self-talk regarding uncertainty over learning coursework. Sarah observed that self-doubt was a constant theme in her thoughts about dropping out or attending college. Acknowledging self-reliance to achieve success was crucial since self-regulation is more than just performance; it is also about self-awareness of applying those skill sets to different learning environments (Zimmerman, 2002). Two participants described high self-reliance in achieving their academic goals. However, this was contradicted by admitting that poor recall and retention meant they heavily relied upon peers for their success with information on how to complete tasks.

Limitations and Delimitations

Limitations and weaknesses exist in the study that were both institutionally bound and beyond the researcher's ability to circumvent. Delimitations are discussed to highlight factors that contributed to the effectiveness of the research but were imposed to control for experience

with the phenomenon, knowledge of participant self-awareness as a learner, and ability to understand learning environments.

Limitations

In this phenomenological study, the participants were limited to stressed students who were currently enrolled in college courses while suffering EF deficits impacting academic performance within the geographic area of southern California. A more significant number of respondents from more than one site with a larger potential pool size may have produced different findings and with more variables in the data. More diversity of disciplines represented could also have impacted the data and provided a more gender-based and balanced perspective, as this study had only one male and twelve females represented for the stress experience and cognitive challenges. A few participants had never heard of EF before, which may have influenced their ability to respond to some of the questions that addressed cognitive deficits. At the same time, one student could not differentiate between a stress experience and anxiety brought about by a self-identified diagnosed condition.

Delimitations

The study's limitations include the small sample size of 13 participants in the qualitative research pool to adequately represent stress impacts on EF deficits in college students. Delimitations were placed on the study, explicitly stating that participants must be 18 years or older, be college students who have earned at least 30-semester units and identify as experiencing stress during learning. These standards for participation were enacted to ensure students had experienced demanding college-level coursework repeated over several semesters. They could understand how potential stress occurrences may affect learning and to what extent they recognized cognitive deficits. The limitation for the age of the participants, who were

between the ages of 20 and 45, produced a surprising result in that some students offered a comparison of the intensity of the stressful experience of college to that of the less stressed high school encounter. Additionally, this research took place at one community college in one region, which had the potential to limit perspectives from a cultural, religious, and demographical viewpoint. A transcendental phenomenological study method was chosen rather than a hermeneutic phenomenological one due to the implicit bias of the candidate over the personal knowledge of stress impacts on EF, cognition, and academic performance, which limited participant experiences to a critical finding's discussion.

Recommendations for Future Research

Future research should include a variety of participants, reaching for a balanced gender-based population from different cultural, religious, and demographical regions. An expanded study with greater inclusion of higher education districts that lack ID influence could better address the need to consider the frequent stress occurrence and EF difficulties impacting college students. Different research methods, such as ethnographic or case studies and quantitative research, would offer further clarification and interpretation of EF deficits at the point of learning under stressed conditions. A case study analyzing the experiences and decision-making processes of various stakeholders, such as administrators, instructional designers, counseling services, instructors, and students, in a student-focused learning environment would help those stakeholders understand the experiences of those with whom they serve. A quantitative study determining connections between variables using instruction design strategies to improve EF deficits under stress occurrences would improve administrative and practitioner understanding for iterative and collaborative empathetic course design. Data obtained from survey instruments that seek to understand student learning conditions could compare the effectiveness of

empathetic instructional design to traditional course design (Tracey & Hutchinson, 2019).

Conclusion

The purpose of this transcendental phenomenological study was to describe the lived experiences of stressed college students who suffer EF deficits during learning in southern California. This study's conceptual framework was based upon EF as a part of cognition, focusing on working memory, organizing and sequencing of information, attention, and inhibition (Banich, 2009). Participants shared their stressful learning experiences through a writing prompt, interviews, and a focus group meeting to inform a comprehensive view of the phenomenon, resulting in four themes: instructional impact on learning, learner preferences, cognitive difficulties, and stress occurrences. Analysis of these themes added to the literature about EF deficits impacted by stress occurrences and academic performance, demonstrating that stress decreased cognition and related processors and that the current course design does not account for emotional states during learning with a lack of needs assessment for instructional support. Policymakers of student-facing institutions should implement a more realistic and empathetic instructional design to address learner needs and preferences for scholarship and provide professional development for instructors who design their own teaching materials.

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Appendix A: IRB Approval Letter

LIBERTY UNIVERSITY.
INSTITUTIONAL REVIEW BOARD

January 24, 2024
Donna-Maria Trewhella
Christine Saba
Re: IRB Exemption - IRB-FY23-24-1067 Executive Function and Stressed College Students: A
Phenomenological Study to Inform Instructional Design
Dear Donna-Maria Trewhella, Christine Saba,
The Liberty University Institutional Review Board (IRB) has reviewed your application in
accordance with the Office for Human Research Protections (OHRP) and Food and Drug
Administration (FDA) regulations and finds your study to be exempt from further IRB review.
This means you may begin your research with the data-safeguarding methods mentioned in your
approved application, and no further IRB oversight is required.
Your study falls under the following exemption category, which identifies specific situations in
which human participants' research is exempt from the policy set forth in 45 CFR 46:104(d):
Category 2.(iii). Research that only includes interactions involving educational tests (cognitive,
diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of
public behavior (including visual or auditory recording) if at least one of the following criteria is
met:
The information obtained is recorded by the investigator in such a manner that the identity of the
human subjects can readily be ascertained, directly or through identifiers linked to the subjects,
and an IRB conducts a limited IRB review to make the determination required by §46.111(a)(7).
For a PDF of your exemption letter, click on your study number in the My Studies card on your
Cayuse dashboard.
Next, click the Submissions bar beside the Study Details bar on the Study Details page. Finally,
click Initial under Submission Type and choose the Letters tab toward the bottom of the
Submission Details page. Your information sheet and final versions of your study documents can
also be found on the same page under the Attachments tab.
Please note that this exemption only applies to your current research application, and any
modifications to your protocol must be reported to the Liberty University IRB for verification of
continued exemption status. You may report these changes by completing a modification
submission through your Cayuse IRB account.
If you have any questions about this exemption or need assistance in determining whether
possible modifications to your protocol would change your exemption status, please email us at
irb@liberty.edu.
Sincerely,
G. Michele Baker, PhD, CIP
Administrative Chair
Research Ethics Office

Appendix B: Consent Form

Title of the Project: EXECUTIVE FUNCTION AND STRESSED COLLEGE STUDENTS: A PHENOMENOLOGICAL STUDY TO INFORM INSTRUCTIONAL DESIGN
Principal Investigator: Donna-Maria Trewhella, researcher. School of Education, Liberty University

Invitation to be part of a Research Study

You are invited to participate in a research study. To participate, you must be an 18-year-old or older college student who has completed at least 30 credit hours and self-identify as experiencing stress during learning. Taking part in this research project is voluntary.

Please read this entire form and ask questions before deciding whether to participate in this research.

What is the study about, and why is it being done?

The purpose of the study is to describe stressors and how those may impact college students attempting to learn new information. The study will investigate the lived experience of college students and the obstacles they face during the learning cycle.

What will happen if you take part in this study?

If you agree to be in this study, I will ask you to do the following:
1. Participants will be asked to complete a writing prompt. The emailed writing prompt will take approximately 15 minutes to type out on a computer and email back to the researcher.
2. Participants will be asked to complete an individual interview with the researcher. The estimated time for the interview is 45 minutes. The interview will be via a Zoom meeting with audio and video recorded.
3. Participants will be asked to complete a focus group session with the researcher. Focus group sessions will include 2-8 other participants. The estimated time for the focus group session is 45 minutes. The focus group session will be via a Zoom meeting with audio and video recorded. As part of member checking, participants will be asked to review their interview transcripts during the focus group. The estimated time for review is 15 minutes after the meeting.

How could you or others benefit from this study?

Participants should not expect to receive a direct benefit from participating in this study.

Benefits to society include a better understanding of the stress experienced during the learning cycle. Lost time attempting to gain new knowledge and the associated costs may be mitigated through improved learning design as a benefit to college students.

What risks might you experience from being in this study?

The expected risks from participating in this study are minimal, which means they are equal to the risks you would encounter in everyday life. If the recall of the stress experiences causes distress, professional mental health services are provided on campus at ███████████ | E-Mail: ███████████████████ | Register: ████████████████████████.

How will personal information be protected?

The records of this study will be kept private. Published reports will not include any information that will make it possible to identify a subject. Research records will be stored securely, and only the researcher will have access to the records.

- Participant responses will be kept confidential by replacing names with pseudonyms.
- Interviews will be conducted via a Zoom meeting where others will not overhear the conversation.
- Confidentiality cannot be guaranteed in focus group settings. While discouraged, other focus group members may share what was discussed with persons outside the group.
- Data collected from you may be used in future research studies and/or shared with other researchers. If data collected from you is reused or shared, any information that could identify you, if applicable, will be removed beforehand.
- Data will be stored on a password-locked computer. After three years, all electronic records will be deleted, and hardcopy (handwritten memoing stored in a locked filing cabinet) will be shredded.
- Recordings will be stored on a password-locked computer. Participants will have reviewed and confirmed the accuracy of the individual interview transcripts during the focus group. The researcher and members of her doctoral committee will have access to these recordings. After three years, all recordings will be deleted.

How will you be compensated for being part of the study?

Participants will be compensated for participating in this study. After completing all study procedures, participants will receive a $100 Amazon gift card. Email and/or mailing addresses will be requested for compensation purposes depending on participants' preferred method of receiving compensation.

Is study participation voluntary?

Participation in this study is voluntary. Your participation will not affect your current or future relations with Liberty University. If you decide to participate, you are free not to answer any questions or withdraw without affecting those relationships.

What should you do if you decide to withdraw from the study?

If you choose to withdraw from the study, please contact the researcher at the email address or phone number in the next paragraph. Should you choose to withdraw, data collected from you, apart from focus group data, will be destroyed immediately and not included in this study. Focus

group data will not be destroyed, but your contributions to the focus group will not be included in the study if you choose to withdraw.

Whom do you contact if you have questions or concerns about the study?

The researcher conducting this study is Donna-Maria Trewhella at dftrewhella@liberty.edu. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact us at ▮▮▮▮▮▮▮▮. You may also contact the researcher's faculty sponsor, Dr. Christine Saba, Edd, at csaba@liberty.edu.

Whom do you contact if you have questions about your rights as a research participant?

If you have any questions or concerns regarding this study and want to talk to someone other than the researcher, **you are encouraged** to contact the IRB. Our physical address is Institutional Review Board, 1971 University Blvd., Green Hall Ste. 2845, Lynchburg, VA, 24515; our phone number is 434-592-5530, and our email address is irb@liberty.edu.

Disclaimer: The Institutional Review Board (IRB) ensures that human subjects research will be conducted ethically as defined and required by federal regulations. The topics covered and viewpoints expressed or alluded to by student and faculty researchers are those of the researchers and do not necessarily reflect the official policies or positions of Liberty University.

Your Consent

By signing this document, you are agreeing to be in this study. Make sure you understand what the study is about before you sign. You will be given a copy of this document for your records. The researcher will keep a copy of the study records. If you have any questions about the study after you sign this document, you can contact the study team using the information provided above.
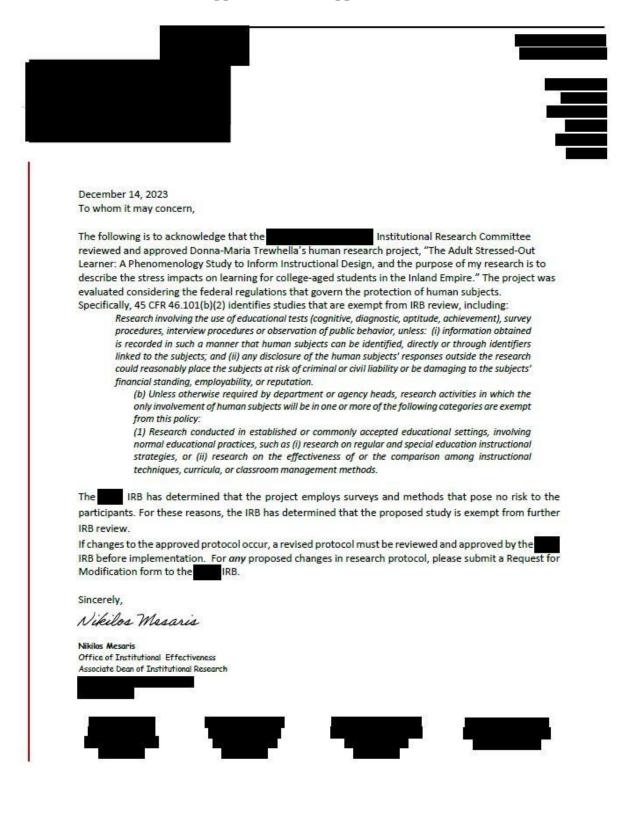
I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study.

☐ The researcher has my permission to audio-record/video-record me as part of my participation in this study.

_____

Printed Subject Name

_____

Signature & Date

Appendix C: Site Approval Letter

December 14, 2023

To whom it may concern,

The following is to acknowledge that the ███████████ Institutional Research Committee reviewed and approved Donna-Maria Trewhella's human research project, "The Adult Stressed-Out Learner: A Phenomenology Study to Inform Instructional Design, and the purpose of my research is to describe the stress impacts on learning for college-aged students in the Inland Empire." The project was evaluated considering the federal regulations that govern the protection of human subjects. Specifically, 45 CFR 46.101(b)(2) identifies studies that are exempt from IRB review, including:

> *Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.*
>
> > *(b) Unless otherwise required by department or agency heads, research activities in which the only involvement of human subjects will be in one or more of the following categories are exempt from this policy:*
> >
> > *(1) Research conducted in established or commonly accepted educational settings, involving normal educational practices, such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.*

The ███ IRB has determined that the project employs surveys and methods that pose no risk to the participants. For these reasons, the IRB has determined that the proposed study is exempt from further IRB review.

If changes to the approved protocol occur, a revised protocol must be reviewed and approved by the ███ IRB before implementation. For *any* proposed changes in research protocol, please submit a Request for Modification form to the ███ IRB.

Sincerely,

Nikilos Mesaris

Nikilos Mesaris
Office of Institutional Effectiveness
Associate Dean of Institutional Research

Appendix D: Recruitment Email

Dear [Recipient]:

As a doctoral candidate in the School of Education at Liberty University, I am conducting research as part of the requirements for a Doctor of Philosophy degree. The purpose of my research is to describe the stressful experiences of college students during the learning cycle, and I am writing to invite eligible participants to join my study.

Participants must be 18 years or older college students who have earned at least 30 credit hours and identify as experiencing stress during learning. Participants will be asked to take an online writing prompt, participate in a one-on-one Zoom meeting with audio recording, and participate in a video-recorded Zoom meeting focus group. It should take approximately two hours to complete the procedures listed. Names and other identifying information will be requested for this study, but the information will remain confidential.

To participate, please get in touch with me at ████████████████████████ to schedule a time for an initial interview.

A consent document is attached to this email and will be emailed during the interview. The consent document contains additional information about my research.

Participants will receive a $100 Amazon gift card.

Sincerely,

Donna-Maria Trewhella

Researcher

████████████████

Appendix E: Permission Request Letter

November 30th, 2023

Dear [Recipient],

As a graduate student in the School of Education at Liberty University, I am conducting research as part of the requirements for a Doctor of Philosophy degree. The title of my research project is Executive Function and Stressed College Students: A Phenomenological Study to Inform Instructional Design which aims to describe stress impacts on learning for college-aged students in Southern California.

I am requesting your permission to conduct my research via Zoom meetings and contact students to invite them to participate in my research study. Participants will be asked to complete a writing prompt (15 minutes), an audio/video-recorded individual interview (45 minutes), and an audio/video-recorded focus group interview (45 minutes). After the study, participants will be asked to review the transcriptions of the interviews (15 minutes). Participants will be presented with informed consent information before participating, which is entirely voluntary, and participants are welcome to discontinue participation at any time.

Thank you for considering my request. If you grant permission, please provide a signed statement on official letterhead indicating your approval. A permission letter document is attached for your convenience.

Sincerely,

Donna-Maria Trewhella

Doctoral Candidate