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A PREDICTIVE STUDY OF SELF-REGULATED LEARNING IN TEACHER CANDIDATES AND PRAXIS EXAMINATION ACHIEVEMENT

Ayanna Danielle Perkins

A PREDICTIVE STUDY OF SELF-REGULATED LEARNING IN TEACHER CANDIDATES AND PRAXIS EXAMINATION ACHIEVEMENT

by

Ayanna Perkins

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Dedication/ Acknowledgement

Philippians 2:13: NLT For God is working in you, giving you the desire and the power to do what pleases him

I thank God Almighty for His hand in my work. He has made the way clear for me to contribute to the field of Education. I dedicate this dissertation to God and my Lord and Savior, Jesus Christ. I also thank Jeramie Perkins, my husband, and Jaleel Perkins, my son, for your patience, support and understanding throughout this process. I would like to thank my doctoral cohort and committee for offering support, suggestions, and guidance.

Abstract

Nationally, teacher candidates struggle to pass the Praxis examination, which they need to be licensed. Little research has been done to examine the characteristics and learning strategies of teacher candidates who pass and who do not pass the Praxis examination. Studies have shown benefits in the use of self-regulation and achievement in courses and on other examinations. Zimmerman's (1989) self-regulated learning theory describes how teacher candidates engage in self-directed planning, learning, and reflecting to achieve a goal. The purpose of this dissertation is to describe the purpose, method, design, and analysis of a predictive study to determine whether self-regulation, as measured by the Motivated Strategies for Learning Questionnaire (MSLQ), predicts success or failure on the Praxis examination. The MSLQ was disseminated to graduate and undergraduate teacher candidates who have taken the Praxis at least once at a mid-sized Southeastern university. A binominal logistic regression was conducted to determine whether teacher candidates' levels of self-regulation was predictive of their performance on the Praxis examination, controlling for race/ethnicity, gender, and traditional/non-traditional status. The results of the study indicated that self-regulation was predictive of whether candidates passed or failed the Praxis examination. The model predicted 81.7% of the variance between teacher candidates who passed and who failed the Praxis examination. The results of the study contribute to the literature by identifying skills that are associated with teacher candidates passing the Praxis examination.

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Educator Preparation Program (EPP)

Motivated Strategies for Learning Questionnaire (MSLQ)

Self- Regulated Learning (SRL)

Teacher Candidate (TC)

Teacher Education Program (TEP)

Key Words: *Self-Regulated Learning, MSLQ, Praxis, Pre-Service Teachers, Teacher Education.*

CHAPTER ONE: INTRODUCTION

Introduction

The Praxis examinations are standardized exams required for admission into many teacher education programs and for licensure in the United States (Educational Testing Services [ETS], 2022). The failure rate among teacher candidates on the Praxis examinations is significant (Latiker et al., 2013; Petchauer, 2016, 2018; Putnam & Walsh, 2019). For instance, a study of 817 institutions revealed that 54% of test-takers fail the Praxis Elementary: Multiple Subjects exams for the first time and 25% of teacher candidates never pass the exam (Putnam & Walsh, 2019). Existing studies reveal challenges for teacher candidates as they attempt to pass the exam, including lack of institutionally led preparation, low self-efficacy, and motivation (Goldhaber & Hansen, 2010; Latiker et al., 2013; Petchauer, 2016, 2018; Putnam & Walsh, 2019). Furthermore, while there is a demand for a diverse teacher population, studies show a pattern of African American test-takers achieving lower pass rates among their peer groups of different racial backgrounds (Latiker et al., 2013; Petchauer, 2016, 2018; Putman & Walsh, 2019); however, more research is needed to determine the relationship between non-demographic student characteristics factors and student outcomes on the Praxis examination.

Few studies have examined whether specific teacher candidates' characteristics predict student achievement on the Praxis exam, and these studies focused on demographic characteristics (Arnold, 2021; Buzick, 2021; Donahue et al., 2021). Furthermore, a significant gap in the literature exists concerning the skills and attributes of teacher candidates who pass or fail the Praxis examination. However, recent studies in medicine and K-16 education have indicated an association between achievement on examinations and self-regulated learning (SRL) skills (Andrews & Kelly, 2018; Chen et al., 2017; Sebesta et al., 2018). SRL skills include, but

are not limited to, self-evaluating, organizing, planning, goal setting, asking for help, curating an optimal learning environment, and reviewing learning materials (Panadero, 2017; Zheng, 2016; Zimmerman,1989).

Problem of Practice

While researchers have purported that teacher candidates struggle to pass the Praxis examination (Nettles et al., 2011; Putnam &Walsh, 2019; Zhao, 2019) and a few group comparison studies have shown that student characteristics and the implementation of learning strategies influence Praxis examination success (Donahue et al., 2021; Hart, 2021; Latiker, 2013), research has not fully explored these factors, such as the self-regulation skills underlying Praxis examination achievement. Quantitative data regarding the experiences of teacher candidates who take the Praxis examination is limited (Goldhaber& Hansen, 2010; Kimber, 2009; Zhao, 2019). Zimmerman's (1989) Self-regulated learning (SRL) theory suggests that teacher candidates who engage in self-directed planning, learning, and reflecting are likely to achieve goals (Jansen et al., 2018; Pintrich, 1990); thus, those foundational behaviors may also underlie achievement on the Praxis examination. Previous studies have indicated that there is a correlation between demographic factors and achievement on the Praxis examination; such factors include traditional/non-traditional status (Minnick et al., 2013), race (Elpus, 2015; Goldhaber & Hansen, 2017; Putnam & Walsh, 2019; Ndembera et al., 2021), and gender (Elpus, 2015; Ndembera et al., 2021 Thobega & Miller, 2008). The following section explores the previous literature regarding demographic factors and Praxis achievement.

While literature varies on the definition of traditional candidates, this study defines them as teacher candidates under 25 who enrolled in college directly after high school *(Minnick et al., 2013).* Non-traditional teacher candidates are defined as teacher candidates who are over the age

of 25 and/or delayed enrollment by more than one year following graduation (Minnick et al., 2013). A comparison study of teacher candidates suggests that non-traditional candidates passed at a rate of 15% less than traditional candidates and that traditional candidates performed at a rate of 11% higher than non-traditional candidates on the Praxis Elementary Education Content Knowledge Examination (Minnick et al., 2013).

A plethora of studies regarding the Praxis examination has identified differences in performance on the Praxis examination concerning race (Elpus, 2015; Goldhaber & Hansen, 2010). Race is a system of categorization by a person's origin (Census.gov, 2022). Furthermore, the complicated historical and social reasons for differences in the performance of African American candidates have been explored at length, with African American candidates consistently underperforming compared to White candidates on the Praxis examination (Latiker et al., 2013; Petchauer, 2016, 2018; Putnam & Walsh, 2019; Ndembera et al., 2021).

Gender, defined as categories for individuals' sense of gender (Census.gov, 2022), has also been identified as correlated with underperformance. Goldhaber & Hansen (2010) conducted a study of the Praxis data from 178,828 teacher candidates over 11 years and found that people who identified as women scored higher in Reading Praxis examinations and lower on the Math subtest of the Praxis Elementary Education 5017: Curriculum, Assessment, and Instruction Examination; however, people who identified as men scored higher on the Math subtest, but lower on the Reading subtest than their female counterparts. Considering this literature, Praxis research cannot ignore demographic characteristics, such as traditional/non-traditional status, race, and gender variables. These constructs and their relationship to achievement have been previously explored and serve as a foundation for this study, which explores how SRL strategies may be associated with achievement on the Praxis examination.

Purpose Statement

While demographic factors have been explored in association with Praxis performance, there is a need for further research on skills that increase the likelihood that teacher candidates pass the Praxis examination. Therefore, this predictive correlational study aimed to examine whether undergraduate and graduate teacher candidates' self-regulation skills predict whether teacher candidates pass or fail the Praxis examination while controlling for race, gender, and traditional/non-traditional status. The criterion variable, performance on the Praxis examination, was measured using the criteria for passing scores in Tennessee, which range from 155 points to 200 points (ETS.org, 2022). Teacher candidates who made the passing score for the State of Tennessee were considered to have passed; teacher candidates who scored under the passing score for the state of Tennessee were considered to have failed (See Table 1). The demographic variables, race, gender, and traditional/non-traditional status were controlled because each factor may impact the study's results (Goldhaber & Hansen, 2010; Minnick et al., 2013; Putnam & Walsh, 2019).

Self-regulated learning skills are often measured using the Motivated Learning Strategies Questionnaire (MSLQ), a validated survey instrument (Duncan et al., 2015). The 44-item assessment includes scales that measure Motivation (intrinsic value, self-efficacy, and test anxiety), Cognitive Strategy Use, and self-regulation (Duncan et al., 2015; Pintrich & DeGroot, 1990), which are constructs related to the SRL theory. An analysis of MSLQ survey results can help to determine whether specific skill selection is predictive of success or failure on the Praxis examination.

Table 1

Praxis Examination Test Requirements (2022-2023)

Name of Examination	Pass Range (Points)	Failure Range (Points)
5024: Education of Young Children	160-200	100-159
5025: Education of Young Children	156-200	100-155
5205: Teaching Reading: Elementary	159-200	100-158
5002: Elementary K-5 Reading and Language Arts Subtest	157-200	100-156
5003: Elementary K-5 Mathematics Subtest	157-200	100-156
5004: Elementary K-5 Social Studies Subtest	155-200	100-154
5005: Science Subtest	159-200	100-158
5135: Art: Content and Analysis	161-200	100-160
5114: Music: Content and Instruction	162-200	100-161
5095: Physical Education	169-200	100-168
5362: English to Speakers of Other Languages	155-200	100-154

5161: Mathematics: Content Knowledge 6-12[1]	160-200	100-159
5165: Mathematics	159-200	100-158
5543: Special Education: Core Knowledge and Mild to Moderate Applications	158-200	100-157

Note. The tests reflected in the table include the tests that teacher candidates must pass in the undergraduate and graduate programs offered by the Southeastern University under study.

Theoretical Framework

Self-Regulated Learning (SRL) theory describes a student's engagement in the intentional, self-directed process involving behaviors that teacher candidates use to accomplish a task (Pintrich, 2000; Zheng, 2016; Zimmerman, 1989). First introduced by Barry Zimmerman, SRL involves a three-part, reciprocal process involving the person, behavior, and environment, referred to as triadic reciprocity (Panadero, 2017; Verma et al., 2018; Zimmerman, 1989). Motivational components, including intrinsic value, self-efficacy, and test anxiety, as well as self-regulatory components, including planning, monitoring progress, rehearsal, elaboration, and metacognitive strategies (i.e., planning, monitoring, and modifying thinking during the learning process), influence a teacher candidates' decision to use SRL strategies (Pintrich & DeGroot, 1990; Zhao, 2019).

SRL theory also addresses the external and emotional factors influencing the teacher candidates' decision to use SRL strategies (Verma et al., 2018). The person-level involves consideration of personal characteristics, motivation, and the student's skill level as it relates to

the task (Verma et al., 2018; Zimmerman, 1989). The environmental level involves the features of the learning environment, such as the physical conditions, resources available, and the social dynamics where the behavior is to occur (Verma et al., 2018; Zimmerman, 1989). The behavioral level involves teacher candidates' actions as they work toward a goal or task (Zimmerman, 1989). Each level in the process influences the other.

Since Zimmerman (1989) introduced SRL, the definition has evolved, and several models have expanded the original theory (Hooshyar et al., 2020; Panadero, 2017; Puspitasari, 2012). Though new research and models have called attention to the motivational and affective aspects of SRL, the theories consist of underlying similarities to Zimmerman's (1989) theory (Panadero, 2017). For instance, the literature on SRL consistently indicates that all three types of self-regulation strategies-- motivational, behavioral, and metacognitive-- should be taught so that teacher candidates can learn to be active participants in their educational experience (Panadero, 2017; Zheng, 2016; Zimmerman, 1990). The phases and components of new models, while named to expand certain aspects of SRL, align with the forethought, planning, and reflection phases (Panadero, 2017). For this reason, Zimmerman's (1989) model was used in this study. Regardless of the SRL model, the key constructs -- motivation, behavior, and metacognition-- are prominent across models (Panadero, 2017).

SRL skills have the potential to address a variety of issues that teacher candidates may experience as they prepare for the Praxis examinations, including motivational components, such as regulating test anxiety (worry), and self-regulated skills, such as developing a plan of action, preparing the environment to learn, choosing the appropriate strategy to approach study material, monitoring and reflecting on one's learning (Pintrich & DeGroot, 1990; Zimmerman, 1990; 2002). Teacher candidates who engage in self-regulated learning are active in their constructive

process of developing and enacting interventions for themselves (Jansen, 2018). More research is needed to understand the outcomes of Praxis test-takers who utilize SRL skills (Polzin, 2018). Self-regulated learning encompasses mindsets, skills, and behaviors that have led to student achievement (Andrews et al.; Locke & Lantham, 2006; Jansen et al., 2018; Mega et al., 2020; Zimmerman, 1989). When teacher candidates engage in the forethought, performance, and reflection phases, their actions may correlate with achieving goal-oriented academic tasks (Jansen et al., 2018). Examination of the following research questions was planned. However, questions one to three were not examined due to the need for more responses to run a binominal logistic analysis. This is primarily due to a recent change in the mid-sized Southeastern University's requirements in Fall 2022, which lowered the ACT score from 21 to 18. This decreased the number of candidates who needed to take the Praxis Core examination.

Research Question(s)

1. **Research Question 1:** To what extent, if at all, do teacher candidates' Self-regulated learning (SRL) skills (i.e. self-regulation, cognitive strategy use, and motivation) predict passing the Praxis examination while controlling for race, gender, and traditional/non-traditional status?
2. **Research Question 2:** To what extent, if at all, do teacher candidates' self-regulation predict passing the Praxis examination while controlling for race, gender, and traditional/non-traditional status?
3. **Research Question 3:** To what extent, if at all, does teacher candidates' cognitive strategy use predict passing the Praxis examination while controlling for race, gender, and traditional/non-traditional status?

4. **Research Question 4:** To what extent, if at all, does teacher candidates' motivation predict passing the Praxis examination while controlling for race, gender, and traditional/non-traditional status?

1. **Null Hypothesis 1:** Self-regulated learning (SRL) skills (i.e. self-regulation, cognitive strategy use, and motivation) do not statistically significantly predict passing the Praxis examination while controlling for race, gender, and traditional/non-traditional status.
2. **Null Hypothesis 2:** Teacher candidates' levels of self-regulation skills do not statistically significantly predict passing the Praxis examination while controlling for race, gender, and traditional/non-traditional status.
3. **Null Hypothesis 3:** Teacher candidates' cognitive strategy use does not statistically significantly predict passing the Praxis examination while controlling for race, gender, and traditional/non-traditional status.
4. **Null Hypothesis 4:** Teacher candidates' levels of motivation do not statistically significantly predict passing the Praxis examination while controlling for race, gender, and traditional/non-traditional status.

Definitions

Cognitive Strategy Use. Cognitive Strategy Use refers to the ability to process information, select key ideas, and alternate study strategies to reach goals (Pintrich & DeGroot, 1990).

Gender. Gender refers to categories for describing an individual's sense of their own gender (Census.gov, 2022). Categories for this study include male, female, and non-binary/third gender (Pritchard et al., 2014).

Motivation: *Motivation* refers to **a** level of concern about performance, motivation, self-direction, and volition (Pintrich & DeGroot, 1990).

Non-Traditional Status. Non-Traditional status generally refers to teacher candidates over 25 and/or delayed enrollment by more than one year following graduation (Minnick et al., 2013).

Race. *Race* is defined as a system of categorization by a person's origin. (Census.gov, 2022). Categories for this study include American Indian/Alaska Native, Asian, African American, Multiracial, Native Hawaiian or Other Pacific Islander, White, or race/ethnicity not listed.

self-regulation. *Self-regulation* refers to selecting appropriate resources, focusing, managing time wisely, self-testing, and adjusting strategies to reach a goal (Pintrich & DeGroot, 1990).

Self-Regulated Learning Theory. First introduced by Zimmerman (1989), the Self-Regulated Learning theory describes the cyclical process of forethought (planning, setting goals), performance (cognitive strategy use, monitoring), and self-reflection (review of performance and adjustment) that a person uses to perform a task (Pintrich & DeGroot, 1990).

Teacher Candidate: A teacher candidate is an undergraduate or graduate student in the Teacher Education program pursuing a teaching license.

Traditional Status. Traditional status refers to teacher candidates under 25 years of age who are enrolled in college directly after high school (Minnick et al., 2013).

CHAPTER TWO: REVIEW OF THE LITERATURE

Introduction

Self-Regulated Learning (SRL) theory was used as the theoretical framework guiding this study. SRL theory was defined through the key constructs of self-regulation, cognitive strategy use, and motivation. This literature review provides an overview of the Praxis examination and critical perspectives of the examination and investigates the problem of high failure rates among Praxis examination test-takers. Furthermore, this review describes the results of the limited research about teacher candidates who pass the examination, demonstrating the need for future studies that explore the characteristics and behaviors of individuals who pass the Praxis examination.

Theoretical Context

Self-Regulated Learning Theory describes the cyclical process of forethought (i.e., planning and setting goals), performance (i.e., cognitive strategy use and monitoring), and self-reflection (review of performance and adjustment) that a person uses to perform a task (Pintrich & DeGroot, Khiat & Vogel, 2022; Zimmerman, 2008). Barry Zimmerman (1989) introduced Self-Regulated Learning Theory in response to a need among social cognitive theorists to differentiate between metacognition and other external and internal self-directive behaviors that individuals enact when seeking to accomplish a goal in academic settings (Khiat & Vogel, 2022; Panadero, 2017; Zimmerman, 1989; 2002; 2008). Self-Regulated Learning theory integrated previous literature involving “learning strategies, metacognitive monitoring, self-concept perceptions, volitional strategies and self-control” (Zimmerman, 2008, p.3). Since the introduction of SRL theory, K-12 studies conducted on higher education and professional

populations indicated that SRL is associated with positive academic performance (Khiat & Vogel, 2022; Panadero, 2017; Zimmerman, 2008).

SRL Phases

SRL describes three phases: forethought, planning, and self-reflection. The forethought phase involves planning and goal setting (Khiat & Vogel, 2022; Zimmerman, 1989; 2008). Planning refers to the strategies that teacher candidates think about using to achieve a goal before enacting them (Zimmerman, 1989; 2008). The performance phase involves the execution of the planned tasks (Khiat & Vogel, 2022; Panadero, 2017; Pintrich, 2000; Zimmerman, 1989). Some tasks include attention focusing, choosing task strategies, imagining success, tracking performance throughout the performance process, and seeking assistance or additional information (Pintrich, 2000). The self-reflection phase involves teacher candidates reflecting on and reacting to their performance, a process called calibration (Laer & Elen, 2019). Each of the phases is summarized in Figure 1. The self-reflection phase impacts a student's subsequent behavior, and the process begins again at the planning phase (Panadero, 2017).

Figure 1

Self- Regulated Learning Phases

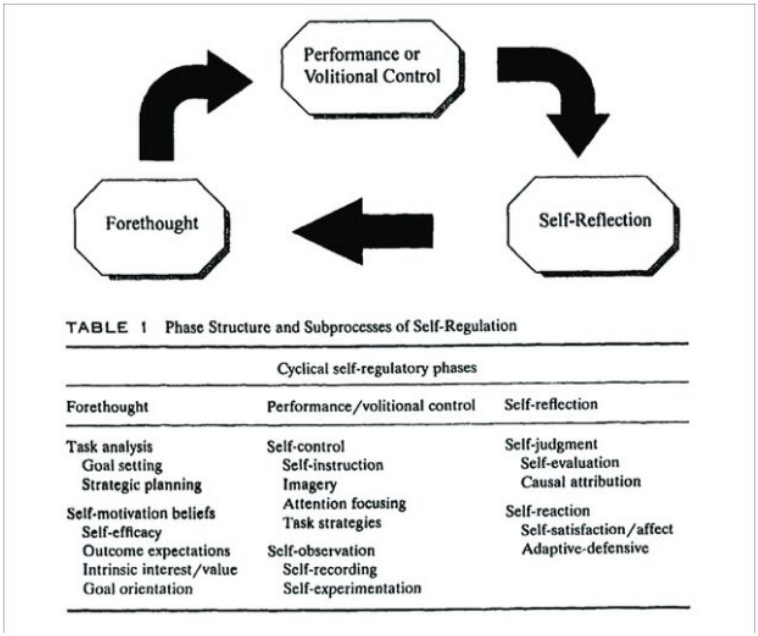


TABLE 1 Phase Structure and Subprocesses of Self-Regulation

Cyclical self-regulatory phases		
Forethought	Performance/volitional control	Self-reflection
Task analysis Goal setting Strategic planning	Self-control Self-instruction Imagery Attention focusing Task strategies	Self-judgment Self-evaluation Causal attribution
Self-motivation beliefs Self-efficacy Outcome expectations Intrinsic interest/value Goal orientation	Self-observation Self-recording Self-experimentation	Self-reaction Self-satisfaction/affect Adaptive-defensive

Note: Reprinted from Panadero (2017).

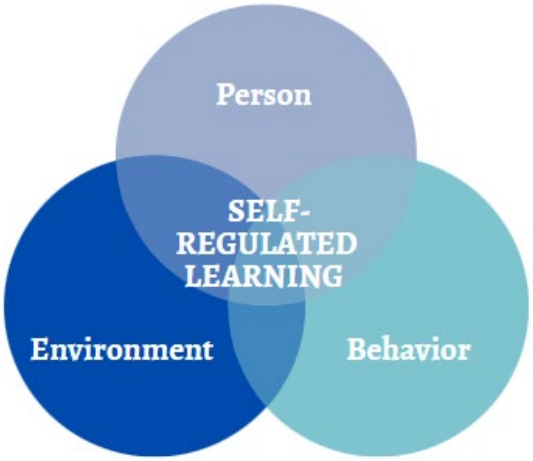
SRL and Triadic Reciprocity

Zimmerman (1989; 2008) recognized that motivation and self-efficacy, as both a student's perceptions and ability to plan and act on tasks related to a goal, play a significant role in an individual's decision to enact SRL. Zimmerman draws upon Bandura's concept of triadic reciprocal determinism to describe how teacher candidates' behavior is not only impacted by personal factors but also environmental and behavioral factors (Panadero, 2017; Zimmerman, 1989). For example, on the environmental level, teacher candidates' decision to review test preparation material may be influenced by whether they are in a quiet environment in an empty classroom or a loud environment at home. Furthermore, Zimmerman (1989) argues that "a

student's proactive use of environmental manipulation strategy… would involve an intervening behavioral sequence of room-altering responses, such as eliminating noise, arranging adequate lighting and arranging a place to write" (p. 330). Thus, how individuals regulate themselves on the personal level (i.e., individuals' motivation and self-efficacy perceptions) and control their environment impacts their behaviors (Li, 2018; Zimmerman, 1989).

Figure 2

Zimmerman's (1989) Triadic Reciprocity



Note. This figure represents the dimensions that individuals regulate to accomplish a task.

Significance of SRL

SRL theory continues to be studied because it illustrates a process for accomplishing tasks across diverse domains (Bembenutty Héfer et al., 2013; Panadero, 2017; Zimmerman, 2008). The findings of several previous studies of both adults and children indicate a strong correlation between previous success after initial failure at an activity and subsequent self-regulatory behavior (Laer & Elen, 2019; Sahranavard & Salehiniya, 2018; Zheng, 2016; Zimmerman, 1989). Zimmerman (1989) proposed that as individuals select self-regulation

strategies, their self-efficacy increases; this claim continues to be supported by studies on self-efficacy (Bandura, 2013; Doménech-Betoret et al., 2017). A recent meta-analysis by Araka et al. (2020) confirmed patterns of SRL strategies that increase student performance.

Furthermore, a meta-analysis by Li et al. (2018) confirmed a pattern of consistent success with the implementation of SRL. Studies have shown that using all phases of SRL has been more effective than using cognitive strategies alone (Panadero, 2017; Wang & Sperling, 2020).

Predictor Variables: Self-regulation, Motivation and Cognitive Strategy Use

Pintrich and DeGroot (1990) developed the Motivated Strategies for Learning Questionnaire to measure teacher candidates' SRL aptitude. The three distinct variables identified include self-regulation, motivation, and cognitive strategy use. The next section of this literature review explores each of the variables as it relates to student achievement.

Self-regulation. Pintrich and DeGroot (1990) differentiate self-regulation from SRL theory. While SRL theory encompasses the cyclical process and motivational components of the person, environment, and behavior levels, self-regulation as a construct focuses only on the person-level self-management skills. Self-regulation refers to selecting appropriate resources, focusing, managing time wisely, self-testing, and adjusting strategies to reach a goal (Pintrich & DeGroot, 1990). Constructed initially from a metacognitive subscale and effort management subscale, Pintrich and DeGroot's (1990) self-regulation scale includes questions concerning "planning, skimming, comprehension monitoring" (p.35) and effort management strategies, defined as the ability to persist when tasks are unengaging or difficult (Pintrich & DeGroot, 1990). A recent study of SRL aptitude in a higher education course suggests that the following self-regulated behaviors were more strongly correlated with higher performance in the course: self-reflection, seeking information, monitoring progress, seeking assistance from the instructor,

and reviewing past work (Sebesta & Bray, 2017). The behaviors of self-reflection and planning/goal setting were most associated with higher academic performance (Sebesta & Bray, 2017).

Planning/Goal-Setting. Among these strategies, planning also referred to as goal-setting, is a strategy associated with high academic performance (Dobronyi, 2019). Goal-setting is a strategy in which teacher candidates determine their desired results before beginning a task. While the study was conducted in classroom settings, a recent study of 4,831 teacher candidates across six Mass Open Online Courses (MOOCs) indicated that teacher candidates who set goals were more likely to attain their goals in the course (Kizilec et al., 2017). Furthermore, a study at a large midwestern university analyzed the achievement of teacher candidates in a course who reflected on how they used the resources that were available to them; the study revealed that teacher candidates who were prompted to reflect on self-regulated learning strategies used available resources more effectively and performed better in the course (Chen et al., 2017).

Self-Reflection and Self-adjustment. Self-reflection refers to considering one's previous performance and metacognitive judgments (Hudesman et al., 2022). In a recent study, teacher candidates' evaluating their performance and developing a plan of improvement are predictive of increased SRL behaviors and exam scores in Science and Math college courses (Chen et al., 2017). For instance, in a study conducted on undergraduate teacher candidates, they were asked to reflect on how they planned to study, the resources they would use, and the reasons for choosing those resources (Chen et al., 2017). The study's results indicated that the process of self-reflection resulted in a greater likelihood that the teacher candidates would use the resources and directly resulted in higher scores, on average, than the control group (Chen et al., 2017).

Furthermore, self-regulated teacher candidates who self-reflect and appropriately adjust can improve their academic performance (Laer & Elen, 2019; Fan et al., 2022; Hudesman et al., 2022). A recent study tracked the self-regulated learning strategy choices and adjustments of in-service teachers who needed to retake an online professional development course (Fan et al., 2022). The study's results revealed that teachers in the online course who adjusted their strategies could perform significantly better on their second attempts, indicating the benefit of reflection on performance and subsequent adjustment when approaching academic tasks (Fan et al., 2022).

Cognitive Strategy Use. Cognitive Strategy Use refers to "rehearsal, elaboration and organizational strategies that have been found to foster active cognitive engagement in learning and result in higher levels of achievement" (Pintrich & DeGroot, 1990, p. 33). Rehearsal refers to strategies involving repetition; elaboration involves summarizing and paraphrasing; organization involves outlining (Pintrich & DeGroot, 1990; Zimmerman, 2008). In a study involving 100 teacher candidates, paraphrasing and summarization skills positively correlated with the writing scores on the Teachers to English Speakers of Other Languages (TESOL) Praxis examination (Burstein et al., 2012). Recent research also indicates a positive relationship between elaboration practices, activating prior knowledge to solve a task, and performance on complex tasks (Carpenter et al., 2020; Khiat & Vogel, 2022).

Motivation. Motivation and emotion impact a teacher candidate's perceptions and motivation to enact SRL strategies (Irvine et al., 2017; Peel, 2020; Puspitasari, 2012). Recent studies have found an association between motivation and emotion with academic performance (Hou, 2020; Mega et al., 2014; Zhu et al., 2020). For instance, a study involving 5,805 undergraduate teacher candidates to determine the relationship between motivation, emotions, and SRL and academic performance found that positive emotions affect teacher candidates'

summarization skills, organization of a study schedule, and reflection during study sessions (Mega et al., 2014). Furthermore, “positive emotions positively affect academic achievement when mediated by self-regulated learning and motivation” (Mega et al., 2014, p. 128). The results of this study illustrate the reciprocal and complex relationship with SRL practices, emotions, motivation, and performance.

Review of the Literature[1]

The Origin of Licensure Tests in the United States

Teacher licensure tests have been in existence as early as the 1920s. However, efforts for national teacher standards were formalized in 1930 through the creation of the Cooperative Test Service, established to design national standardized tests for all major academic fields in high school and college (Wilson, 1985). Tests for teachers, which included questions concerning basic skills, cultural knowledge, and moral character, were initially used during The Great Depression to "assist urban school superintendents in selecting candidates from an oversupply of teachers" (Wilson, 1985, p.4). As the Cooperative Testing Service promoted the tests to school districts, superintendents, and teachers, there was significant criticism of the validity of the tests from the scientific community; however, the Cooperative Test Service continued to promote available tests as a measurement of teacher quality (Wilson, 1985).

In 1940, The Cooperative Test Service (CTS) of the American Council on Education designed the National Teacher Examination to evaluate all teachers' core knowledge. The test included two parts: The Common Examination (Reasoning, English Comprehension,

[1] Because few published studies exist exploring reasons for teacher candidates’ success or failure on the Praxis examination, this literature review includes citations from both dissertations and peer-reviewed, published sources.

Contemporary Affairs, Current Social Problems, Social Science, Literature, Science, Fine Arts, Mathematics) and Professional Information (Education and Social Policy, Child Development and Educational Psychology, Guidance and Individual Group Analysis, and Elementary School Methods or Secondary Methods) (Wilson, 1985). In 1947, the American Council on Education, the Carnegie Foundation, developed ETS as an educational non-profit (ETS, 2023). This non-profit previously administered the National Teacher Examination, which became several separate examinations: The Praxis Core (previously the Praxis I: Pre-Professional Skills Test) and the Praxis II Content Area examinations, which are used by most states today (ETS, 2023).

The Praxis Examination

The Praxis examination consists of a series of assessments that teacher candidates must take for admission into teacher education programs and licensure in over 40 states, including the State of Tennessee (Buzick, 2021; ETS.org, n.d.). While standardized testing has been a requirement for certification in most states since the 1960s (Clark et al., 2017), most states transitioned to the Praxis examination series to assess the general knowledge of teacher candidates across states following the 2001 reauthorization of the Elementary and Secondary Schools Act of 1965, most commonly called the No Child Left Behind Act (NCLB). NCLB required that all teachers be "highly qualified" by 2006 (Comptroller.TN.gov, n.d.; Hart, 2021). To be considered "highly qualified," new and existing educators had to demonstrate their knowledge in the content area(s) for which they taught. Though the Every Student Succeeds Act (ESSA), which replaced NCLB in 2015, repealed the "highly-qualified" requirement (Comptroller.TN.gov, n.d.), Tennessee, along with most states, still requires teachers to pass Praxis examinations for their licensure areas. Teacher licensure examinations are designed to be

objective tools for screening potential teacher candidates for their level of teacher quality (Goldhaber &Hansen, 2010).

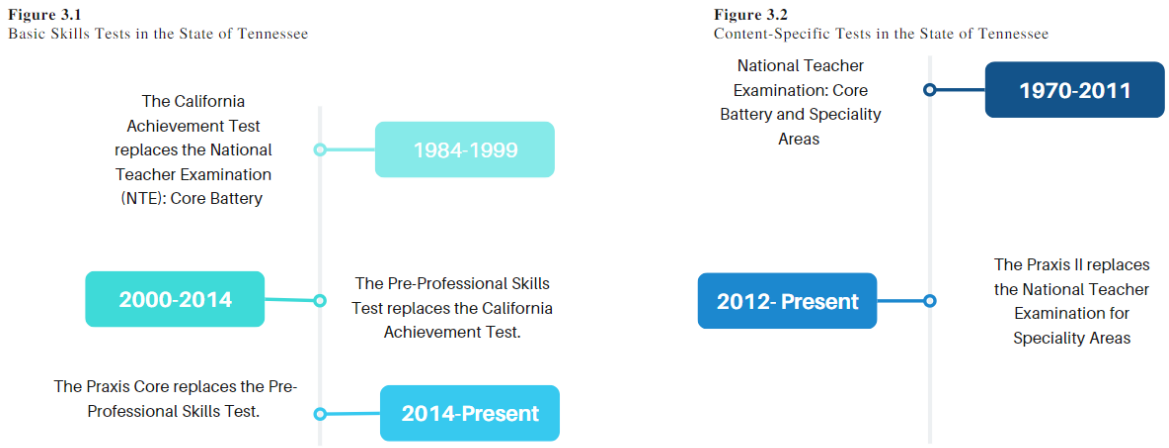
Generally, licensure tests are designed to support decisions about readiness for safe and/or effective performance in practice. The passing score is supposed to be high enough to provide adequate protection to the public but not so high as to unduly restrict professional access. (Kane, 2004, p. 161, as cited in Gitomer et al. 2011). Though the literature on the Praxis examination achievement is limited, existing studies primarily focus on reasons for failure in Praxis examinations.

The History of Licensure Tests in Tennessee

In Tennessee, admissions into Educator Preparation Programs and Teacher licensure requirements have changed over time. Figures 3.1-3.2 provide an overview of the changes.

Figure 3

Licensure Tests History Timeline



Teacher Education Programs have required examinations for licensure and for admission into the Teacher Education Program as early as the 1970s (Memphis State University Bulletin, 1970). The National Teacher Examination was paper-based and hand-scored by a representative from the Education Preparation Program (Mary Lanier, Personal Communication, 12-13-22). This examination included basic skills components and specialty areas (Wilson, 1985). In 1984, the State of Tennessee replaced the National Teacher Examination: Core Battery and adopted the Praxis I Pre-Professional Skills Test (PPST), which was the predecessor of the Praxis I Core (Memphis State University Bulletin, 1984). The Praxis I PPST, which was developed and scored by ETS, consisted of the Reading, Writing, and Math Section (ETS. 2013). The computer-delivered test lasted 218 minutes and consisted of 132 questions and one essay (Educational Testing Services, 2013). The paper version lasted 188 minutes and consisted of 120 questions. In 2014, Praxis I Core replaced the PPST (Educational Testing Services, 2013). The Praxis I Core is a 270-question, computer-delivered test with two essays and more questions on each test (Reading-56; Writing; 40 and Math- 56) (ETS, 2023).

In terms of State of Tennessee licensure requirements, the content-specific component of the National Teacher Examination was utilized until ETS transitioned to Praxis II examinations through the late 1990s and early 2000s. In addition to this examination, the State of Tennessee also required another examination called the Principals of Learning and Teaching Examination for Licensure until Tennessee adopted Pearson's edTPA examination in 2019. (Tennessee Department of Education, 2018).

The Praxis Core. The Praxis Core examination consists of general knowledge questions in the areas of Reading, Writing, and Math (ETS.org, n.d.). The computer-delivered examinations consist of multiple-choice questions, multiple-select- questions, short-answer

constructed-response questions, and numeric entry (ETS.org, n.d.). The Praxis Core is a basic skills examination that has been predictive of achievement on the content area examinations (Buzick, 2021; Gitomer, 2011). As of 2022, the Praxis Core examination is utilized by 25 states (ETS.org, n.d.).

The Praxis Content Examination. The Praxis Content examinations are licensure requirements for most states (Buzick, 2021). The Praxis examinations include over 90 exams, which cover the content for the specific subjects for which candidates seek to be licensed (ETS, n.d.). For instance, candidates licensed in Elementary Education take the Elementary Reading and Language Arts examination, which consists of questions concerning foundational skills for learning how to read literature and informational text, writing skills, and conventions of standard English (Educational Testing Services, 2021). The computer-delivered examinations consist of multiple-choice questions, multiple-select- questions, short-answer constructed-response questions, and numeric entry questions (ETS.org, n.d.).

Critical Perspectives.

Praxis examinations have received criticism as a gatekeeping mechanism for teachers of color (Bennett, 2006; Petchauer, 2019; Shuls, 2016). Teachers sued in five states (Alabama, California, New York, Massachusetts, and Texas) to contest the licensure tests as an appropriate measure of teacher quality, with the State of Alabama and the State of New York State ruling on behalf of the teachers (Putnam & Walsh, 2019). Though standardized testing of teacher candidates has been used to address teacher quality, there has been increasing criticism and concern about teacher examinations as a barrier to entry for teacher candidates of color (Elpus, 2012; Graham, 2017; Petchauer, 2016; Hart, 2021). Putnam & Walsh (2019) reported that, on average, 62% of African Americans do not pass Praxis examinations compared to a 43% failure

rate among their White counterparts. Similarly, Gitomer et al. (2011) reported that, on average, 48% of African Americans did not pass the Praxis Core examination compared to 13% of White Candidates.

Researchers have also posted concerns about the validity of the test as a proficient indicator of effectiveness in the classroom (Goldhaber & Hansen, 2010; Shuls, 2016). Literature suggests that there is limited evidence of teacher candidates' performance on the Praxis examination and the subsequent achievement of K-12 teacher candidates in the classroom (Gitomer, 2011; Goldhaber & Hansen, 2010; Shuls, 2016). Furthermore, a particular emphasis has been placed on the disparity between African Americans and their White counterparts due to the "large and disturbing" (Gitomer et al., 2011) disparity between African American and White teacher candidates on the Praxis examinations. Several studies have tested the validity of Praxis examinations and indicated differing results (Gitomer et al., 2011; Goldhaber & Hansen, 2010; Hart, 2021). For instance, Goldhaber & Hansen (2010) found significant differences in the pass rates of White teacher candidates and teacher candidates of color, which indicated a level of bias in the examination. On the other hand, Buzick (2021) concludes that while the differences in pass rates among White teacher candidates and teacher candidates of color are considered statistically significant, the effect sizes were small.

Another related issue concerns the cutoff scores, which vary by state. Though the validity of the Praxis examinations has historically received mixed results (Buzick, 2021; Goldhaber & Hansen, 2010; Gitomer, et al., 2011, Shuls, 2016), some researchers advocate for raising the cutoff scores. The variability of the Praxis cutoff scores indicates that a teacher can be deemed as "quality" in one state but may not meet the requirements of another state (Goldhaber & Hansen, 2010; Shuls, 2016). This variability has caused ongoing debates in the literature concerning

whether the tests serve as barriers for candidates who would otherwise become effective classroom teachers (Gitomer, et al. 2010; Goldhaber & Hansen, 2010; Riquelme, 2011).

Educational Testing Services Response

In 2014, ETS revised its previous standards and addressed issues concerning testing bias through the development of inclusive adoption of techniques for ensuring quality and fairness. This document establishes audit schedules by which tests are reviewed to ensure that the tests are "sound, fair, assessable and useful" (Educational Testing Services, 2014, p. 2). ETS further states that if it is legally required, ETS reports differences among demographics and conducts research to investigate issues concerning validity and reliability (Educational Testing Services, 2014). ETS has funded multiple research projects regarding the demographic differences in test-takers and their performance (Buzick, 2021; Nettles et al., 2011; Tyler et al., 2011).

Furthermore, ETS has established committees -- Test Development Standing Committees and National Advisory Committees (NACs)—to review the tests annually (ETS.org, n.d.) The Test Development Standing Committees review each Praxis exam and consider whether the test categories and specifications are still relevant. If the Standing Committee recommends changes, then ETS has experts to determine whether a change is necessary (ETS.org, n.d.) If internal and external experts determine that a change does not need to be made, then the test will remain unchanged; however, if it is determined that a change is needed, then ETS will address the change. If the change requires more input, then National Advisory Committees (NACs) convene to "update the test specifications to improve alignment, and ETS performs a job analysis confirmation survey." Limited information exists on the committees, meetings, or the results of those meetings.

Reasons for Failure on the Praxis Examination

The failure rate among teacher candidates on both the Praxis Core and Content examinations is significant (Goldhaber &Hansen, 2010; Gitomer, 2011; Putnam & Walsh, 2019; Nettles, 2011). The failure rate among teacher candidates on the Elementary Praxis examination has been as high as 54% among first-time test takers (Putnam & Walsh, 2019). Furthermore, while there is a demand for a diverse teacher population, studies show a pattern of African American test-takers achieving lower pass rates among their peer groups of different racial backgrounds (Latiker et al., 2013; Petchauer, 2016, 2018; Putman & Walsh, 2019).

Research has shown that failure on the Praxis exams could result from a lack of prior knowledge and institutional preparation (Latiker et al., 2013; Petchauer, 2016; Putman & Walsh, 2019). For example, Putnam & Walsh (2019) report that only 21 of the 817 institutions prepared teacher candidates for most of the content knowledge they would need to pass the Praxis examination. Similarly, Latiker et al. (2013) studied the preparation practices, beliefs about the Praxis, and outcomes of 100 pre-service teachers and found that the lack of institutionally led preparation and resources also led to a lack of motivation to prepare for the examination. Furthermore, a three-year study of African American teacher candidates who were preparing for the Praxis Core examination revealed that teacher candidates' previous experiences significantly impacted teacher candidates' belief of their ability to succeed on the exam as well as vicarious experiences of other African Americans on the exams (Petchauer, 2016). Of the 31 teacher candidates, previous experiences and vicarious experiences were the primary determinants for whether teacher candidates believed that they could pass the exam (Petchauer, 2016). The results of Gitomer et al. (2010) support Latiker's findings, as the results suggest that candidates who take the Praxis multiple times are less likely ever to pass the examination. Similarly, Putnam and

Walsh (2019) report that 76% of graduate Education programs do not cover content in their curriculums, leaving candidates to independently prepare for the content area examinations.

Reasons for Success on the Praxis Examination

Only some studies explore reasons that candidates may succeed on the Praxis examination (McAdoo & Harrison, 2018; Hart, 2021). Petchauer (2018) conducted a qualitative study on the influence of self-efficacy in three African American preservice teachers who passed the Praxis examination after initially failing. In both studies, self-efficacy was the salient theme among those who succeeded (Petchauer, 2016, 2018). The limited studies investigating reasons for success or failure on the Praxis examination have only been conducted on small sample sizes, indicating a need for future studies or a larger population of preservice teachers (Latiker et al., 2013; Petchauer, 2016, 2018). Recent studies recommend multifaceted interventions, including embedded Praxis curricula, asynchronous study resources, and peer tutoring to increase the pass rates of teacher candidates (McAdoo & Harrison, 2018; Wynter- Hoyte et al., 2020). This research is further supported by two recent experimental studies that indicate an increase in points for all participants on an attempt at the Praxis examination following instructional Praxis interventions (Hart, 2021; Odom-Bartel, 2020).

SRL and the Praxis Examination

Self-regulated learning (SRL) theory encompasses metacognitive strategies and behaviors that have been associated with academic performance; therefore, these strategies may also result in better performance for teacher candidates preparing for the Praxis examination. A plethora of resources are available to teacher candidates to prepare, but teacher candidates must have the skills to access the resources, self-reflect on their performance, and self-adjust (Petchauer, 2018). For instance, previous research indicates that candidates who initially fail the Praxis examination

have a decreased likelihood of passing the examination on future attempts (Gitomer et al., 2011; Buzick, 2021). However, Petchauer (2018) found that candidates who passed the examination after multiple retakes attributed their success to using testing strategies, help-seeking, planning study sessions, and appropriately selecting study resources.

Furthermore, university-led programs that have reported success in supporting teacher candidates have each provided workshops on not only content but also skills for how to study and prepare for the examination (Rickard & Norden, 2006; McAdoo & Harrison, 2018; Wynter-Hoyte et al., 2020 Hart, 2021). Since the 1990s, ETS has also offered fee-based workshops in which they teach teacher candidates about how to understand the test, assess their understanding, study, practice using practice questions, and adjust (Tyler, 2011). While not explicitly called SRL, the strategies that have led to success are directly related to SRL. This study underscores the benefits of denominating these strategies and quantifying their effectiveness to benefit teacher candidates preparing for standardized examinations.

Summary/ Solution

Teacher candidates must meet several qualifications to attain a teaching license; almost all states require teachers to pass standardized tests to gain teaching certification (Bureau of Labor Statistics, 2020; Latiker et al., 2013). In addition to coursework, observations, and clinical practice, teacher candidates must also complete Praxis examinations (Bureau of Labor Statistics, 2020). While requirements for attaining a teaching license vary by state, most states require teacher candidates to pass one or multiple Praxis exams to become a teacher (ETS, 2020; Latiker et al., 2013). These requirements have often impeded teacher candidates from earning their licenses (Putman &Walsh, 2019; Latiker et al., 2013). Though the Praxis examination is consequential to a potential teacher's ability to persist in a Teacher Education Program and to

gain licensure to teach, few recent studies seek to explore the preparatory behaviors of candidates (Arnold, 2021; Elpus, 2015; Jansen, 2018 Putman & Walsh, 2019).

Furthermore, recent studies indicate the need for effective intervention; however, research is being done to study Praxis interventions (Donahue et al., 2021; Hart, 2021). The lack of literature available indicates a significant need for more research that addresses the high failure rates among teacher candidates on the Praxis examination (Putman &Walsh, 2019). By connecting self-regulated learning as the theory underscoring the successful strategies that have been used to help teacher candidates pass the Praxis, new and unexplored strategies can be identified based on the existing and extensive SRL research.

CHAPTER THREE: METHODOLOGY

Introduction

Teacher candidates must take the Praxis examination for licensure; however, candidates need help to pass the examinations (Putnam & Walsh, 2019). Previous literature suggests an association between certain demographic factors such as race, gender, and traditional/non-traditional status and performance on the Praxis examination (Elpus, 2015; Goldhaber & Hansen, 2010; Minnick et al., 2013). Self-regulated learning theory, which describes motivational, behavioral, and metacognitive processes that individuals use to achieve a goal (Panadero, 2017; Zimmerman, 2002), also provides a framework for identifying skills that teacher candidates can use to achieve success on the Praxis examinations. While demographic factors have been explored, there is a need to identify behaviors and skills predictive of teacher candidates' passing the Praxis examination. Therefore, the purpose of this predictive correlational study was to examine whether undergraduate and graduate teacher candidates' self-regulation skills predict whether teacher candidates pass or fail the Praxis I Core and Praxis II Content examinations while controlling for their race, gender, and traditional/non-traditional status. However, only the pass or fail of the Praxis II Content examinations was examined due to a lack of participation from teacher candidates who had taken the Praxis Core examination by December 2022. This chapter describes the investigation plan, including the method and design, participants, setting, and procedures used in this study.

The Investigation Plan

A predictive correlational design is best used to determine the relationship among multiple variables (Creswell & Gutterman, 2019). A correlational design is appropriate for determining factors' relationship to one another, as in the case of this study, which examines whether teacher candidates' self-regulation skills are predictive of their performance on the Praxis examination. A binominal logistic regression was conducted to analyze the strength of the relationship between teacher candidates' self-reported self-regulation, as measured by the MSLQ, and the criterion variable, the Praxis examination scores, while controlling for demographics (e.g., race, gender, and traditional/non-traditional status). The binominal logistic regression analysis is best used for understanding the extent to which multiple variables impact an outcome (Creswell & Gutterman, 2019).

Setting

The study occurred at a mid-sized Southeastern Tennessee university, a state institution in an urban metropolitan area. The university has approximately 21,563 individuals enrolled, with a primarily diverse student population (45% White; 38% African American). The university consists of predominately female (61%), traditional teacher candidates, with approximately 69% of teacher candidates being under the age of 25. While the COE demographics are similar to university demographics, a primary difference exists among candidates over 25 years of age (See Table 3.1). This is primarily due to the range of graduate programs offered on the Master's and Doctoral levels in The College of Education.

Table 3.1

College of Education- Fall 2022 Student Enrollment by Race, Gender, and Age

	University (*N*= 21,563)	College of Education (*N*= 1,499)
Gender		
Female	13,135 (61%)	1,246 (83%)
Male	8,456 (39%)	253 (17%)
Undisclosed	31 (<1%)	0
Race		
American Indian/ Alaskan	43 (1%)	4 (<1%)
Asian	970 (4%)	23 (2%)
African American	7,360 (34%)	576 (38%)
Hispanic	1,513 (7%)	80 (5%)
Multi-Race	732 (3%)	31 2%
Native Hawaiian/Pacific Islander	5 (<1%)	1 (<1%)
Non-Resident Alien	916 (4%)	9 (1%)

Not Specified	353 (1%)	14 (1%)
White	9,730 (45%)	761 (51%)
Age		
25+	6,630 (31%)	897 (60%)
Under 25	14,992 (69%)	602 (40%)

Note. Percentages were rounded to the nearest percentage point.

The undergraduate teacher education program consists of Elementary (K-5), Secondary Math (6-12), Art Education (K-12), Music Education, Teaching English as a Second Language (K-12), and Physical Education (K-12). Undergraduate teacher candidates are expected to pass the Praxis Core examination by the end of the first semester of Junior year. Teacher candidates who scored an 18 or higher on the American Core Testing (ACT) test and have a GPA of 2.75 or higher do not have to take the Praxis Core examination. All teacher candidates must take the Praxis II Content Examination(s) for licensure by the first semester of their senior year. Graduates in the Master of Arts in Teaching (MAT) program major in Early Childhood, Elementary K-5, Secondary Education 6-12, Special Education Art, Teaching English as a Second Language (TESOL), Physical Education, Music, and World Languages. MAT candidates need to take the Praxis Core. MAT candidates must pass all content area examinations by the time they complete the first twelve hours of graduate coursework. The Praxis examination can be

taken in a monitored environment with a proctor at pre-established ETS locations. The Praxis examination can also be taken at home under the supervision of an online proctor.

Table 3.2 summarizes the demographics of the Educator Preparation Program at the mid-sized Southeastern University. As of Fall 2022, five hundred ninety-five teacher candidates were enrolled. The program is predominantly female (*n*=280), and the predominant races include teacher candidates who identify as White (*n*=281) or African American (*n*=252). The program comprises most teacher candidates under the age of 25. This difference could be attributed to the Master of Arts in Teaching (MAT) program, which is an online program that both traditional teacher candidates and current teachers hired on a temporary license can use to complete their studies as they teach full-time.

Table 3.2

Educator Preparation Program - Fall 2022 Student Enrollment by Race, Gender, and Age

	Undergraduates (*N*= 280)	Graduates (*N*= 315)	Total (*N* = 595)
Gender			
Female	240 (86%)	240 (76%)	280
Male	40 (14%)	75 (24%)	115
Undisclosed	0	0	0
Race			

Asian	2 (<1%)	2 (<1%)	4
African American	94 (34%)	158 (50%)	252
Hispanic	17 (6%)	13 (4%)	30
Multi-Race	9 (3%)	9 (3%)	18
American Indian/Alaskan	N/A	1 (<1%)	1
Non-Resident Alien	2 (<1%)	1 (<1%)	3
Not Specified	2 (<1%)	4 (1%)	6
White	154 (55%)	127 (40%)	281
Age			
25+	84 (30%)	242 (77%)	326
Under 25	196 (70%)	73 (23%)	269

Note. Total includes all Juniors, Seniors, and Graduates; rounded to the nearest whole number.

Teacher Candidate Characteristics

The participants in this study were a convenience sample of 82 teacher candidates at a mid-sized Southeastern University who took a Praxis examination. Access to the convenience sample is due to the employment of the principal investigator. The participants primarily consisted of individuals who identified as either White (65%) or Black (30%) female (84%) teacher candidates over 25 years of age (68%). Table 4.1 summarizes the characteristics of teacher candidates who were retained in the survey analysis (See Table 4.1). These demographics align with the most recent National demographics for Educator Preparation Programs, primarily identifying as White and female (The United States Department of Education, 2021). Table 3.2 summarizes the characteristics of teacher candidates who participated in the study with national demographics (See Table 3.3). The participants are slightly more diverse than national statistics, with a 20% higher percentage of African Americans. The combined percentage of non-White and White respondents parallels the national statistics (approximately 30-35% non-White and 65-67% White). Similarly, the respondent demographics parallel National Demographics for gender, which is primarily female; however, the percentage of male respondents is lower than the national percentage of male teacher candidates (22%). Statistics concerning the traditional or non-traditional status of teacher candidates were not collected nationally.

Table 3.3

Educator Preparation Program – Comparison of Student Demographics to National Educator Preparation Demographics by Race and Gender

	Teacher Candidates (*N*= 82)	National Demographics (*N*= 569,010)
Gender		
Female	69 (85%)	441,074 (78%)
Male	12 (15%)	127,936 (22%)
Third Gender	1 (1.2%)	0
Total	82	569,010
Race		
Asian	0	16,599 (3%)
African American	25 (31%)	53,674 (10%)
Hispanic	1 (1%)	81,756 (16%)
Multi-Race	1 (1%)	14,923 (3%)
American Indian/Alaskan	2 (2%)	3,246 (>1%)

White	53 (65%)	343,300 (67%)
Total	82	515,545

Note. The national statistics did not provide an option for a third gender; fewer candidates reported their race than their gender.

Instrumentation

The Shortened Motivated Strategies for Learning Questionnaire (MSLQ) was used for this study to measure the predictor variables of Self-Regulation, Cognitive Strategy Use, and Motivation. The MSLQ survey is a validated and reliable instrument used to predict teacher candidates' academic performance and advise teacher candidates on study habits and study skills (Araka et al., 2020). Since the MSLQ was created, it has been validated and normed for both children and adult teacher candidates in relation to academic performance (Cook & Thomas, 2011; Khampirat, 2021; Pintrich & DeGroot, 1990; Zimmerman, 2008). The three scales include motivation (intrinsic goal orientation, self-efficacy, and test anxiety) and Cognitive Strategy Use and self-regulation (Pintrich & DeGroot, 1990). On the MSLQ, students rated themselves on a Likert scale of 1-7 (1= "not at all true of me" and 7= "Very true of me").

The Motivated Strategies for Learning Questionnaire was validated through a study that included a sample of 380 college students from Midwestern institutions (Pintrich, 1990). Confirmatory factor analysis showed that the MSLQ has acceptable factor validity. Since its initial validation, recent literature indicates that the MLSQ is valid and reliable for students in higher education environments (Holland, 2018; Khampirat, 2021). Holland et al. (2018) conducted a meta-analysis of 245 peer-reviewed articles that used the MSLQ and analyzed the results using alpha reliability coefficients. The articles were coded based on the demographics

(gender, location, age group, setting) and used as predictor variables. Common modifications (i.e., deletion of questions, modification or wording, use of particular subscales, translations) were coded as moderator variables and considered in the Ordinary Least Squares (OLS) regression analysis. The results indicated that the MLSQ had the highest level of reliability in higher education settings when given in English. Cronbach's alpha coefficient was calculated to determine whether the instrument was reliable for the sample population. The results are reported in Chapter 4. Appendix A includes a copy of the instrument (See Appendix A).

The control variables included race/ethnic background, traditional/non-traditional status, and gender. Each was measured using a survey question (See Table 3). All control variables were nominal and were dummy coded, as explained in Chapter 4. Finally, the criterion variable was a dichotomous variable (i.e., a nominal variable with two outcomes) --Praxis pass or failure. The subjects of the Praxis examination and the cutoff scores for each exam are explained in Chapter 1, Table 1. This variable was also dummy coded, which is also discussed in Chapter 4.

Table 3.4

Control and Criterion Variables

Traditional/Non-Traditional	Survey Question	Traditional: Enrolled directly from high school and/or under 25 years old; Non-traditional- did not enroll directly from high school and/or over 25 years old
Gender	Survey Question	Male, Female, Non-binary/third gender, Prefer not to say

Race/Ethnic Background	Survey Question	American Indian or Alaska Native, Asian, African American, or African American, Hispanic/Latino, Multiracial, Native Hawaiian or Other Pacific Islander, White, A race/ethnicity not listed here
Criterion Variable		
Pass/Fail Praxis Examination Status	Argos Database	*See Table 1.*

Procedure

After securing Institutional Review Board (IRB) approval and permission from the University, the principal investigator emailed 588 undergraduate and graduate teacher candidates in The College of Education pursuing teaching licensure in Fall 2022. The survey was administered via Qualtrics online, where the information was securely stored. Teacher candidates received three follow-up emails to remind them to take the survey. Announcements were also made at Summer and Fall orientations for Juniors, Seniors, and Master of Arts in Teaching candidates. Additionally, a request was made to have a survey shared by instructors in the department of Instruction, Curriculum, and Leadership, as well as instructors for Art Education, Music Education, Physical Education, and Teachers of English to Speakers of Other Languages.

In the email, the teacher candidates were provided a synopsis of the study and a copy of a PDF with the questions to review in advance. Teacher candidates were asked to follow the Qualtrics link in the email to complete the survey. Teacher candidates provided consent to participate in the study on the first page of the survey. On the second page of the survey, teacher candidates answered demographic questions. As part of the survey, teacher candidates also

provided their university identification, which the Principal Investigator used to retrieve Praxis Core and Content Area Scores via the Argos database. Teacher candidates then answered the 53-question MSLQ. Table 3.4 summarizes the research question and survey alignment (See Table 3.4).

Table 3.5

Research Questions and Survey Question Alignment- Predictor Variables

Research Question	Data Source	Predictor Variable	Survey Question
RQ 1: To what extent, if at all, do teacher candidates' Self-regulated learning (SRL) skills (i.e. self-regulation, cognitive strategy use and motivation) predict passing the Praxis examination, while controlling for their demographics (e.g., race, gender, and traditional/non-traditional status?	MSLQ	Self-regulation, Cognitive Strategy Use, and Motivation	Questions 1-44
RQ 2: To what extent, if at all, do teacher candidates' self-regulation predict passing the Praxis examination, while controlling for their demographics (e.g., race, gender, and traditional/non-traditional status?)	MSLQ	Self-regulation	Questions 23,24,25,26,28,30, 31, 34, 35,36, 39, 40,41,42,44

RQ 3: To what extent, if at all, do teacher candidates' cognitive strategy use predict passing the Praxis examination, while controlling for their demographics (e.g., race, gender, and traditional/non-traditional status?) Criterion Variable	MSLQ	Cognitive Strategy Use	Questions 27, 29, 32,33,37,38,
RQ 4: To what extent, if at all, do teacher candidates' motivation predict passing the Praxis examination while controlling for their demographics (e.g., race, gender, and traditional/non-traditional status?)	MSLQ	Motivation	Questions 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18, 19, 20, 21,22,43

The responses of each participant were housed in Qualtrics until 219 survey responses were collected. After 219 responses were collected, the principal investigator closed the survey and downloaded the results into a secure, password-protected OneDrive Excel Spreadsheet.

The Argos database retrieves and archives standardized test results, including teacher candidates' scores for each time that they take an examination. The principal investigator first input each University ID in Argos to identify and delete duplicate survey responses. Then, the principal investigator reviewed each respondent's Praxis Core and Praxis examination results. If a survey respondent had ever passed an examination, then the survey response was marked as

"passed" in SPSS. If a respondent failed and never passed the examination, the response was marked as "failed" in SPSS. Any candidates who did not have Praxis examination scores for either the Praxis Core or Content examination were removed from the analysis. After the scores were reviewed, the data were de-identified in SPSS by removing University IDs.

Analysis

After data were collected, the data were exported to SPSS to run a regression analysis. A binominal logistic regression analysis was conducted to analyze the strength of the relationship between Self-regulation, Cognitive Strategy Use, Motivation, and Praxis performance (i.e., pass/fail status of teacher candidates) while controlling for race, gender, and traditional/non-traditional status. A binominal regression was chosen because it predicts the probability that an observation falls into one of two categories of a dichotomous dependent variable (Josephat & Ame, 2018). In the present study, the dependent/criterion variables describe whether or not a candidate passed the Content Examination (yes, no) based on three predictor variables, which include the constructs of Self-Regulated Learning, as measured by the MSLQ (Self- regulation, Cognitive Strategy Use, Motivation). The binomial logistic regression is an alternative to a standard multiple regression because it allows for an analysis of a nominal criterion/dependent variable. For binominal logistic regression, Josephat and Ame (2018) suggested a sample size of at least 15 participants per independent variable; therefore, a minimum sample size of 45 is appropriate for this study.

The descriptive statistics include race, gender, and traditional/non-traditional status. These factors were controlled during analysis so that the results could be attributed to the predictor variables. Furthermore, each of the predictor variables was dummy-coded. The motivation scales (intrinsic value, self-efficacy, and test anxiety) represented the motivational

and emotional components of SRL and were coded as (MOT). The self-regulated learning component scales, which represent behaviors and learning strategies, Cognitive Strategy Use (CSU), and self-regulation (SR), were run separately (Pintrich & DeGroot, 1990).

Descriptive statistics were also used to determine whether the sample met the assumptions needed for the logistic analysis. The sample size was reviewed, and the principal investigator concluded that the assumptions of sample size and expected cell frequencies were met. A box-Tidwell procedure was used to test the linearity of the logit. The standard errors of each predictor variable were reviewed to ensure that the assumption of multicollinearity was met. The studentized residual values were reviewed to identify extreme outliers. All assumptions were met for the Praxis Examination; however, the sample size assumption still needed to be met for the number of cases with the Praxis Core examination. As a result, the Praxis Core examination was not analyzed.

A binominal logistic regression was run with the passing and failing scores of all teacher candidates who took the Praxis Examination. The tests represented in the sample include 5002 Elementary Reading, 5003- Elementary Math, 5004- Elementary Social Studies, 5005 Elementary Science 5205- Teaching Reading , 5135: Art Content and Analysis, 5024-Education of Young Children, 5025-Early Childhood Education, Economics, 5543- Special Education, 5545- Special Education Severe and Profound, 5235- Biology, 5195 Spanish: World Languages, 5161:Mathematics Content Knowledge, 5038: English Language Literature & Composition, 5095: Physical Education, 5183: German- World Languages, 5245: Chemistry: Content Knowledge, 5114: Music Content & Instruction, and 5941: World and US History. The results of the logistic regression are summarized in Chapter 4.

Summary

Chapter 3 provided an overview of the methodology of this study, including an explanation of the instrumentation used, as well as data collection and analysis procedures. The MLSQ was disseminated to teacher candidates at a mid-sized Southeastern university to determine whether there was a predictive relationship between SRL and whether teacher candidates passed or failed the Praxis examination. A binominal logistic regression was run. Chapter 4 will provide a report of the results, including demographic information, assumptions testing, and the results from the analysis.

CHAPTER FOUR: RESULTS

Introduction

This predictive correlational study examines whether undergraduate and graduate teacher candidates' self-regulation skills predict whether teacher candidates pass or fail the Praxis examination while controlling for race, gender, and traditional/non-traditional status. This chapter includes a report and summary of the logistic regression findings. Only results from the Praxis Content examination were reported because the low response rate of teacher candidates who took the Praxis Core examination precluded a logistic regression analysis.

The survey was disseminated to 1,499 teacher candidates enrolled during the Summer 2022 and Fall 2022 semesters. 219 undergraduate and graduate teacher candidates at a Southeastern public institution submitted a survey response. Two hundred-ten respondents consented to participation in the research. Nine respondents did not consent to participate in the research, 20 responses were removed as duplicates, and 68 respondents submitted incomplete survey responses, only completing the demographic survey questions. One hundred and thirteen respondents completed the survey. Of the 113 respondents, 22 had yet to take a Praxis examination as of December 2022. After removing the respondents who had yet to take the Praxis examination, 82 candidates remained. The results from (N=82) candidates who took the Praxis examination were used in the analysis. The following questions were addressed in the analysis.

Research Question 1: To what extent, if at all, do teacher candidates' Self-regulated learning (SRL) skills (i.e. self-regulation, cognitive strategy use, and motivation) predict passing the Praxis examination while controlling for race, gender, and traditional/non-traditional status?

Research Question 2: To what extent, if at all, do teacher candidates' self-regulation predict passing the Praxis examination while controlling for race, gender, and traditional/non-traditional status?

Research Question 3: To what extent, if at all, does teacher candidates' cognitive strategy use predict passing the Praxis examination while controlling for race, gender, and traditional/non-traditional status?

Research Question 4: To what extent, if at all, does teacher candidates' motivation predict passing the Praxis examination while controlling for race, gender, and traditional/non-traditional status?

Null Hypothesis 1: Self-regulated learning (SRL) skills (i.e. self-regulation, cognitive strategy use, and motivation) do not statistically significantly predict passing the Praxis examination while controlling for race, gender, and traditional/non-traditional status.

Null Hypothesis 2: Teacher candidates' levels of self-regulation skills do not statistically significantly predict passing the Praxis examination while controlling for race, gender, and traditional/non-traditional status.

Null Hypothesis 3: Teacher candidates' cognitive strategy use does not statistically significantly predict passing the Praxis examination while controlling for race, gender, and traditional/non-traditional status.

Null Hypothesis 4: Teacher candidates' levels of motivation do not statistically significantly predict passing the Praxis examination while controlling for race, gender, and traditional/non-traditional status.

Descriptive Variables- Demographics

The demographics of the respondents, including race/ethnic background, gender, traditional/non-traditional status, and classification, are summarized in Table 4.1 below. Race/ ethnic background, gender, and traditional/non-traditional status were controlled in this study. Race was dummy-coded as White=1 and Non-White=0 because there were fewer than 15 respondents who identified as American or Alaska Native (n=2), Hispanic/Latino (n=1), or Multiracial (n=1). No respondents (n=0) selected A race/ethnicity not listed or Asian, Native Hawaiian, or Other Pacific Islander; therefore, these categories were not included in the analysis. Similarly, the male respondents (n= 12) and non-binary/third gender (n=1) categories were dummy-coded to Non-Female=0. The female category (n=69) was dummy coded, female=1. Traditional status was dummy coded as traditional=1, and post-traditional/non-traditional status was coded as n=0. The respondents included (n=56) traditional candidates and (n=26) non-traditional candidates.

Table 4.1

Demographic Variables for Praxis Data Analysis

Demographic Item	Responses	*n*	%
Race/Ethnic Background	American Indian/Alaska Native (0)	2	2.4
	Black or African American (0)	25	30.5
	Hispanic/Latino (0)	1	1.2
	Multiracial (0)	1	1.2
	White (1)	53	64.6
	Total	82	100.00
Gender	Female (1)	69	84.1
	Male (0)	12	14.6
	Third Gender (0)	1	1.2
	Total	82	100.00
Traditional Status	Traditional (1)	56	68.3
	Post/Non-Traditional (0)	26	31.7
	Total	82	100.00

Praxis performance (pass= 1/fail=0) was the criterion variable under study, and the elements of Self-Regulated Learning skills, which consisted of Self-regulation, Cognitive Strategy Use, and Motivation, were the predictor variables. Table 4.2 below shows the dichotomized descriptive statistics of candidates who passed or failed the Praxis examinations (See Table 4.2).

Table 4.2

Demographic Variables for Praxis Data Analysis

Praxis Performance	Responses	*n*	%
	Passed (1)	63	76.8
	Failed (0)	19	23.2
	Total	82	100.00

Table 4.3 shows the disaggregated descriptive statistics of the constructs of Self-regulation, Cognitive Strategy Use, and Motivation in the scores for teacher candidates who passed and failed the Praxis. These constructs were measured using the Motivated Strategies for Learning Questionnaire, which included the scales: Self-regulation, Cognitive Strategy Use, and Motivation. The alpha level set to determine significance was .05. The analyses were conducted using SPSS, version 27 (See Table 4.3).

Table 4.3

Descriptive Statistics for Predictor Variables (N = 82)

	Pass *(n = 63)*		Fail *(n = 19)*	
	M	*SD*	*M*	*SD*
Self-regulation	4.91	.667	4.89	.550
Cognitive Strategy Use	4.84	1.001	5.07	.867
Motivation	4.88	.703	4.66	1.90

Assumption Testing

Data were analyzed using binominal logistic regression. Before conducting the binominal logistic regression, assumption testing was completed. Josephat and Ame (2018) describe the six assumptions that must be met for a logistic regression model: assumptions of same size, expected

cell frequencies, linearity of the logit, multicollinearity, outliers/influential cases, and independence of the residuals. The sample size assumption was met because the recommended sample size is 15 cases per independent variable (Josephat & Ame, 2018). With three independent variables, the sample size should be at least 45 cases; this assumption was met because the present study includes 82 cases. Similarly, Josephat and Ame (2018) recommend that at least 15 cases are represented for the descriptive frequencies. By dummy-coding, the descriptive statistics for race (white/non-white) and gender (female/non-female), this assumption of expected cell frequencies was met. Furthermore, the independence of the residuals was met because cases could either be identified as passed or failed.

The assumption of multicollinearity was met because none of the standard errors of the predictor variables—self-regulation (SD= .589), Cognitive Strategy Use (SD= .589), and Motivation (SD=.486) —were larger than 2.0. The Box-Tidwell (1962) procedure was used to evaluate linearity between the scores for the predictor variables – Self-regulation, Cognitive Strategy Use, and Motivation -- and the criterion variable -- pass/fail performance on the Praxis examination. Using the Bonferroni correction with the four terms [number of control and predictor variables] of the model, the statistical significance was set at $p < .00125$ (Tabachnick & Fidell, 2014). The results of the Box-Tidwell (1962) procedure were not significant: Self-regulation ($p = .575$), Cognitive Strategy Use ($p = .045$), and Motivation ($p = .422$). Consequently, the assumption of linearity was met. The predictor variables -- Self-regulation, Cognitive Strategy Use, and Motivation-- were all linearly related to the logit of the dependent variable. Furthermore, residual values were evaluated to identify extreme outliers with residual values above 2.5 standard deviations. Cases 7, 14, 16, and 17 included residual values above 2.5

standard deviations. However, none of the cases were significantly above 2.5 standard deviations; therefore, the assumption of Independence of the residuals was met.

Binominal Logistic Regression

The regression model, consisting of the control variables, race/ethnicity, gender, and traditional/non-traditional status also statistically significantly predicted whether teacher candidates passed or failed the Praxis $\chi^2(3) = 16.108$, $p = .001$. According to Cox and Snell *R* Square and Nagelkerke *R* Square, respectively, the model accounted for between 17.8% and 27% of the variance among the pass/fail outcomes on the Praxis Examination. Moreover, the model with the control variables and predictor variables, Self-regulation, Cognitive Strategy Use, and Motivation, statistically significantly predicted whether teacher candidates passed or failed the Praxis $\chi^2(6) = 2.806$, $p = .004$. With the addition of the predictor variables, the effect sizes improved. According to Cox and Snell *R* Square and Nagelkerke *R* Square, respectively, the model accounted for between 20.6% and 31.1% of the variance among the pass/fail outcomes on the Praxis Examination. This model predicted 81.7% of the Praxis Content Area examination outcomes, in comparison to the 76.8% prediction level with all variables excluded.

While the combination of the predictor variables, as well as the control variables did predict teacher candidates' passing or failing the Praxis examination, the control variable, race, was the only variable that made an individual significant contribution to explaining the variance in the criterion variable (See Table 4.4). The contribution of race as a significant variable is further evidenced by the data on candidates who passed and failed the Praxis Examination by race (See Table 4.5). Of the 63 respondents who passed the examination, only 15 (23.8%) of the candidates were Non-White, in comparison to the 48 candidates who identified as White

(76.2%). Furthermore, 14 of the 19 respondents who failed the Praxis examination identified as Non-White (73.7%), in comparison to the five candidates who identified as White (26.3%) who failed.

Table 4.4

Table 4.4

Results of the Regression Analysis for Each Variable (*N* = 82)

Variable	B	S.E.	Wald	*df*	*p*	Exp(B)	Lower	Upper
self-regulation	.399	.589	.458	1	.499	1.490	.470	4.728
Cognitive strategy Use	-.370	.402	.858	1	.357	.691	.314	1.518
Motivation	.762	.486	2.459	1	.117	2.142	.827	5.551
Gender	1.154	.868	1.769	1	.183	3.172	.579	17.378
Traditional/Non-Traditional Status	.503	.718	.490	1	.484	1.653	.405	6.752
Race/Ethnicity	2.081	.633	10.817	1	.001	8.015	2.319	27.706

*Note. *p < .05*

Table 4.5

Results of Praxis Performance by Race

Praxis Performance		*n*	%
Passed (1)	White (1)	48	76.2
	Non-White (0)	15	23.8
	Total	63	100
Failed (0)	White (1)	5	73.7
	Non-White (0)	14	26.3
	Total	19	100
	Total	82	100.00

Summary

Chapter 4 summarized the findings of this study. To determine whether there was a predictive relationship between SRL and whether teacher candidates passed or failed the Praxis examination, a binominal logistic regression was run. The results of the analysis indicated that Self-Regulated Learning is a statistically significant predictor of whether teacher candidates passed or failed the Praxis examination. However, the only individual significant contributor was the control variable, Race/Ethnicity, when the entire model with all variables was considered. Chapter 5 will provide an analysis of the results, including a discussion of the results and implications for practical implementation of the results. Chapter 5 will also discuss limitations and recommendations for future study.

CHAPTER FIVE: DISCUSSION AND CONCLUSIONS

This predictive correlational study aimed to examine whether undergraduate and graduate teacher candidates' self-regulated learning skills predict whether teacher candidates pass or fail the Praxis examination while controlling for race, gender, and traditional/non-traditional status. Due to the low response rate of teacher candidates who took the Praxis Core examination, the results for the Praxis Core examination could not be analyzed. This chapter will interpret the results from respondents who took the Praxis Content Area examinations. The chapter concludes with recommendations for future studies.

Summary of the Results

The study's results indicated that self-regulated learning skills, including Self-regulation, Cognitive Strategy Use, and Motivation, statistically significantly predict whether teacher candidates will pass or fail the Praxis examination. Furthermore, the model predicted an 81.7% variance between teacher candidates who passed and those who failed the Praxis examination. While the combination of predictor variables predicted whether teacher candidates passed or failed the Praxis examination, the effect size was small, explaining between 20.6%-31.1% of the variance. Furthermore, the control variable, race, was the only significant individual contributor to explain the variance among teacher candidates who passed and failed the Praxis examination.

Discussion

The results of this study advance and extend recent literature that indicates self-regulated learning skills are predictive of academic success. The results show that teacher candidates who self-report higher levels of self-regulated learning skills are more likely to pass the Praxis examination. The findings are consistent with previous studies that indicate that Self-regulated

learning skills, such as cognitive strategies, metacognitive strategies, motivation, focus, environmental control, time management, and resource management, can contribute to individuals achieving academic goals (Mega et al., 2014; Pintrich & DeGroot, 1990; Yip; 2019). Previously, SRL has been used to address success in the field of higher education to meet academic goals, such as scores on course examinations and grades in classes (Andrews, 2018; Cezero et al., 2019; Kustandi et al., 2020). The results of this study extend the literature on SRL to include the areas of teacher preparation and standardized testing.

These results also extend the body of knowledge concerning the Praxis examination, which has primarily focused on demographic differences among teacher candidates who passed or failed the Praxis examination. While literature previously explored differences in the areas of race, gender, and traditional/non-traditional status, few studies focused on skill-based attributes. The results of this study contribute to this body of literature by identifying skill-based differences among teacher candidates as an additional predictive variable. Moreover, this study extends the results of qualitative studies that describe strategies that researchers attribute to increasing the likelihood of passing the Praxis examination (Petchauer, 2018; Rickard & Norden, 2006; Wynter-Hoyte, 2020).

Teacher candidates who passed the Praxis examination reported higher averages for Self-regulation and Motivation than teacher candidates who failed the Praxis examination. Often, teacher candidates prepare for the Praxis examinations without a specific curriculum or instructor to guide them. Therefore, teacher candidates must be able to identify resources, choose appropriate environments to study, use their study time effectively, and adjust their strategies based on the results of their practice. Teacher candidates must also be able to motivate

themselves to enact the SRL skills needed to prepare for the Praxis examination. The results confirm that these SRL skills are predictive of success.

On the other hand, if candidates do not possess Self-regulated skills, they are more likely to fail the Praxis examination. A variety of barriers could impact a teacher candidate's decision to prepare for the Praxis examination. Teacher candidates may balance employment, families, and academic responsibilities, which leaves preparation for the Praxis examination behind. However, contrary to expectations, the teacher candidates who failed the Praxis examination rated themselves, on average, higher on Cognitive Strategy Use than the candidates who passed the examination. One reason for this result is that teacher candidates may have selected more socially desirable responses on the Cognitive Strategy Use scale. Socially desirable responses refer to respondents self-reporting responses that seem more desirable on Likert-scale surveys (Rosen et al., 2017). Similarly, the results could be attributed to acquiescent bias, which refers to the tendency of respondents to choose positive responses (Kreitchman et al., 2018). Therefore, the higher averages should be considered with caution.

While the predictor variables—Self-regulation, Cognitive Strategy Use, and Motivation — contributed to the predictability, race was the only individual factor that statistically significantly contributed. These results aligned with the well-documented research that indicates that race predicts success or failure on the Praxis examination (Elpus, 2015; Goldhaber & Hansen, 2010). Previous literature points to additional factors, such as Grade Point Average, parents' highest level of educational attainment, and SAT/ACT scores, as reasons for differences in performance on the Praxis examination (Goldhaber & Hansen, 2010; Nettles et al., 2011). Most recently, Buzick (2022) found a statistically significant difference among races but reported a small effect size. These results affirm that race should be a control variable in Praxis

research; however, it also indicates that more research should be done to investigate why race continues to be a predictive factor.

Neither of the remaining control variables --Traditional/Non-traditional status and gender—were statistically significant individual contributors. For traditional/non-traditional status and gender, these results could be explained by the small sample size—more candidates identified as female than male or third gender. Since the teaching profession is predominantly female, these results align with national statistics (The Department of Education, 2022). Moreover, the Department of Education does not report on the age of teacher candidates; however, adding more individuals over the age of 25 could have diversified the sample and contributed to the model's reliability.

Implications

The results of this study have implications for researchers, school districts, and Educator Preparation Programs because they contribute to understanding the skill-related differences among candidates who pass and fail the Praxis examination. By implementing SRL as the theoretical framework to guide the study, the present study provides a foundation for addressing a multitude of the complex issues presented when investigating Praxis performance. SRL addresses internal and external factors that impact motivation to prepare for an examination and performance and adjustment based on results (Theobald, 2021; Yip, 2021; Zimmerman, 2008).

These results imply that Educator Preparation Programs should incorporate SRL skills in the educational curricula. Educator Preparation Programs may invest in resources that should support teacher candidates passing the examination; however, if teacher candidates are not self-regulated learners, then they may not take advantage of the resources that they have available. Moreover, training programs that taught self-regulated learning strategies have been reported to

enhance academic performance, especially among older individuals with traditionally lower academic performance (Theobald, 2021). Therefore, in addition to providing adequate resources, SRL skills should be taught to teacher candidates so that they know how to use the resources that they have available to increase the likelihood that they pass the Praxis examination.

The findings also suggest that Educator Preparation Programs and school districts should be proactive with populations that research has identified as more likely to be unsuccessful on the Praxis examination. School districts and Educator Preparation programs should use predictive variables, such as race, gender, and traditional/non-traditional status, to identify teacher candidates who need additional support and provide resources and assistance that increase the likelihood of candidates passing the Praxis examination. For instance, in the present study, the mid-sized Southeastern university currently provides Praxis workshops, 1:1 coaching, and Praxis study materials to teacher candidates, who can access the support via the university website. This provides various synchronous and asynchronous resources instead of a more general approach to support teacher candidates. Therefore, scholars must use what is known about candidates who fail the Praxis examination to identify and proactively resource candidates with research-based tools and strategies that will increase their chances for success on the Praxis examination (Hart, 2021; Rickard & Norden, 2006; Tyler et al., 2011).

While it is important that race was controlled for the purpose of this study, the results of this study imply that race should remain an important factor in discussions and research concerning the Praxis examination. The results of this study should begin a proactive line of inquiry concerning actionable steps that can be taken to support teachers of color, who disproportionally fail the Praxis examination. Until there is a national discussion to further investigate methods for licensing teachers, the Praxis examination remains, along with the

differences in performance among racial groups. Therefore, these differences should continue to be addressed and investigated.

Limitations and Recommendations

The most significant limitation of the study involves the low response rate among teacher candidates who took the Praxis Core examination, which resulted in a need for more sufficient data to perform the analysis. Primarily due to a recent change in the admissions requirements at the mid-sized Southeastern university, which lowered the ACT minimum score from a 21 to an 18, the number of candidates who need to take the Praxis Core has significantly decreased. Nevertheless, as of 2023, the Praxis Core examination is still a requirement in 25 states (ETS.org; n.d.). Therefore, it remains important for future studies to determine whether there is a relationship between SRL and whether teacher candidates pass or fail the Praxis Core examination. It is recommended that future studies across multiple higher education institutions explore the relationship between SRL and teacher candidates' performance on the Praxis Core examination.

While the study results were statistically significant, the small effect size reduces the practical generalizability of the results. The effect size may be due to the number of respondents who completed their participation in the study. There are several reasons for the small sample. One reason is that 68 respondents only completed the demographic information, which may be due to the survey including a forced response feature that required teacher candidates to complete the questions on the MSLQ. Also, teacher candidates could have experienced survey fatigue, which generally refers to the length of time and the amount of effort a respondent is asked to expend to complete a survey (Fass-Holmes, 2022). Future studies should avoid using

the force response option and instead carefully plan for how to handle missing survey data through modeling or deletion methods to avoid these issues (Kang, 2013).

Another reason for the response rate includes the voluntary nature of the survey. While the incentive of having a chance to win an Amazon gift card was offered, more was needed to increase participation. However, small, nonmonetary incentives can increase the response rate of higher education respondents (Sundstrom et al., 2016). Therefore, to increase the response rate among teacher candidates who passed and failed the Praxis examination, future research should be done as a classroom activity for an incentive, such as a grade or extra credit. The addition of the survey as a course assignment would increase the likelihood that the teacher candidates who have taken the Praxis examination will complete the survey and increase the variety of respondents among those who passed and failed because respondents will have the incentive to complete the survey.

Additionally, the present study used the shortened 53-question MSLQ, which is still a considerable length. This consideration aligns with recent research to adapt and validate shorter versions of the MSLQ to reduce response fatigue (Olivari, 2015; Zurita-Ortega et al.,2019). Researchers have validated shortened instruments in several countries, including the Spanish and Italian contexts (Olivari, 2015; Zurita-Ortega et al.,2019). Furthermore, the Short self-regulation Questionnaire, while less widely used than the MSLQ, is a validated and reliable 31-question survey instrument used to measure SRL (Chen & Lin, 2018). Therefore, future studies can address anticipated survey fatigue using shorter versions of the MSLQ or by using other validated and reliable instruments that measure Self-regulated Learning.

This study design was also limited to a quantitative measure. Future mixed method designs are needed to address the complexity of performance on the Praxis examination. The

results of a mixed methods study would complement the results of the self-regulation construct. Furthermore, the study was limited to teacher candidates' pass/fail status as of December 2022; it could not incorporate results from teacher candidates who still need to take the examination, although they completed the MSLQ. Since teacher candidates must take and pass a Praxis examination during their matriculation through college, future studies should include a longitudinal analysis of the results to capture more data over time. Moreover, since the binominal logistic analysis was used in the present study, the simple pass/fail design needs to provide insight into the variance among the scores. Due to differences in pass/fail scores across states, a future study using standard multiple regression could identify differences among the scores. Multiple regression is best used to determine how a set of variables predicts an outcome and compare the predictability among variables (Pallant, 2001). Therefore, a multiple regression would allow comparisons of higher and lower scores and those scores' relationships with the Praxis examination.

This study focused on undergraduates and graduate level teacher candidates; however, graduate-level teacher candidates represent a unique population for two reasons. One significant difference is that the graduates under study only take courses online, unlike the undergraduates, who can take some courses online but must take most courses in person. Therefore, SRL in graduate teacher candidates could be measured using an instrument that aligns explicitly with the experience of a distance learner. A recent instrument, the Online Self-Regulated Learning Questionnaire (OSLQ), is a valid and reliable instrument for measuring the self-regulation skills of distance learners (Barnard et al., 2010; Stephen, Rockinson-Szapkiw, 2021). The skills measured – goal-setting, environment structuring, task strategies, time-management, help-

seeking, and self-evaluation – align with the MSLQ but are phrased in a way that targets online learners. Therefore, future studies should utilize the OSLQ for online learners.

Another significant difference between undergraduates and graduate-level teacher candidates is that graduate-level teacher candidates can be hired as full-time teachers of record while pursuing a teaching license. Due to the increasing need for teachers, districts have provided alternative pathways for teachers to teach in the classroom while they earn a certification (Mentzer et al., 2019; Roberts, 2022). Districts with in-service teachers hired on a job-embedded license or a permit must pass the examination to maintain their classroom positions. These in-service teachers represent a burgeoning, understudied population who also need various resources and support. Professional developments should be created to train in-service teachers to apply SRL skills to Praxis preparation. As this unique population of in-service teacher candidates taking the Praxis examination grows, further research is needed to explore SRL for in-service teacher candidates as a unique subgroup of graduate students.

Conclusion

The Praxis examination refers to standardized exams required for admission into many teachers' education programs and for teacher licensure. Licensure examinations are expected in professional fields, but the Praxis examination has consistently had unusually high failure rates. The Praxis examination is often the only barrier separating aspiring teachers from the classroom; however, little research has been done to provide guidance on this phenomenon. Previous research has been primarily deficit-based. For this reason, race, gender, and traditional/non-traditional status were selected as control variables in this predictive study based on previous predictive studies. The predictive correlational study examined whether undergraduate and

graduate teacher candidates' self-regulation skills predict whether teacher candidates pass or fail the Praxis examination while controlling for race, gender, and traditional/non-traditional status.

Self-regulated learning was chosen as the theoretical framework because it provides a structure and describes the self-directed process and skills that individuals use to accomplish tasks. By connecting self-regulated learning as the theory underscoring the successful strategies that have been used to help teacher candidates pass the Praxis, new and unexplored strategies can be identified based on the existing and extensive body of SRL literature. The results of this study showed that teacher candidates who passed the Praxis examination reported higher averages for Self-regulation and Motivation than teacher candidates who failed the Praxis examination. Moreover, the results of this study extend the literature on SRL to include the areas of teacher preparation and standardized testing. Future studies should utilize a variety of methodologies and SRL instruments that identify nuance within the range of Praxis scores and further explore differences among in-service and pre-service teacher candidates' levels of self-regulated learning.

REFERENCES

Andrews, M. A., Kelly, W. F., & Dezee, K. J. (2018). Why does this student perform poorly on tests? Using self-regulated learning theory to diagnose the problem and implement solutions. *Academic Medicine*, *93*(4), 612–615. https://doi.org/10.1097/acm.0000000000001422

Araka, E., Maina, E., Gitonga, R., & Oboko, R. (2020). Research trends in measurement and intervention tools for self-regulated learning for e-learning environments—systematic review (2008–2018). *Research and Practice in Technology Enhanced Learning*, *15*(1). https://doi.org/10.1186/s41039-020-00129-5

Arnold, Miranda, "The Predictive Relationship between Elementary Pre-service Teacher Praxis Subject Assessment Scores and Pedagogical Knowledge" (2021). *Doctoral Dissertations and Projects*. 3136. https://digitalcommons.liberty.edu/doctoral/3136

Bandura, A. (2013). The role of self-efficacy in goal-based motivation. In E. A. Locke & G. P. Latham (Eds.), *New developments in goal setting and task performance* (p. 147–157). Routledge/Taylor & Francis Group.

Barnard-Brak L, Lan W, Paton V. Profiles in self-regulated learning in the online learning environment. *International Review of Research in Open and Distance Learning.* 2010;11(1):61–79. doi: 10.19173/irrodl.v11i1.769.

Bembenutty Héfer, Cleary, T. J., Kitsantas, A., Schunk, D. H., & Zimmerman, B. J. (2013). *Applications of self-regulated learning across diverse disciplines: A tribute to Barry J. Zimmerman*. Information Age Pub.

Bennett C. I., McWhorter L. M., Kuykendall J. A. (2006). Will I ever teach? Latino and African American teacher candidates' perspectives on Praxis I. American Educational Research Journal, 43(3), 531-575.

Bujang, Mohamad Adam & Baharum, Nurakmal. (2016). Sample Size Guideline for Correlation Analysis. World Journal of Social Science Research. 3. 37. 10.22158/wjssr.v3n1p37.

Bureau of Labor Statistics. (2020, September 01). *High school teachers: Occupational outlook handbook.* Retrieved September 28, 2020, from https://www.bls.gov/ooh/education-training-and-library/high-school-teachers.html

Burstein, J., Flor, M., Tetreault, J., Madnani, N., & Holtzman, S. (2012). Examining linguistic characteristics of paraphrase in test-taker summaries. *ETS Research Report Series*, *2012*(2), i-46. https://doi.org/10.1002/j.2333-8504.2012.tb02300.x

Carpenter, S., Endres, T. & Hui, L. (2020). Teacher candidates' use of retrieval in self-regulated learning: Implications for monitoring and regulating effortful learning experiences. *Educational Psychology Review.* 32, 1029–1054 (2020). https://doi.org/10.1007/s10648-020-09562-w

Cerezo, R., Bogarín, A., Esteban, M., & Romero, C. (2019). Process mining for self-regulated learning assessment in e-learning. *Journal of Computing in Higher Education*, 32(1), 74–88. https://doi.org/10.1007/s12528-019-09225-y

Chen, P., Chavez, O., Ong, D. C., & Gunderson, B. (2017). Strategic resource use for learning: A self-administered intervention that guides self-reflection on effective resource use enhances academic performance. *Psychological Science, 28*(6), 774-785. https://10.1177/0956797617696456

Chen, Y.-H., & Lin, Y.-J. (2018). Validation of the short self-regulation questionnaire for taiwanese college teacher candidates (TSSRQ). *Frontiers in Psychology*, *9*.

Dobronyi, C. R., Oreopoulos, P., & Petronijevic, U. (2019). Goal setting, academic reminders, and college success: A large-scale field experiment. *Journal of Research on Educational Effectiveness, 12*(1), 38-66. doi:10.1080/19345747.2018.1517849

Doménech-Betoret, F., Abellán-Roselló, L., & Gómez-Artiga, A. (2017). Self- Efficacy, satisfaction, and academic achievement: The Mediator Role of Teacher candidates' Expectancy-Value Beliefs. *Frontiers in Psychology, 8*. doi:10.3389/fpsyg.2017.01193

Donahue, T., Rentz, B., Santos, M., Aguon, A. C., & Arens, S. A. (2021). Using high school and college data to predict teacher candidates' performance on the Praxis at Unibetsedåt Guåhan (University of Guam). REL 2021-104. Regional Educational Laboratory Pacific. http://ies.ed.gov/ncee/edlabs.

Educational Testing Service. (2013). Praxis Comparison Charts. Princeton, New Jersey.

Educational Testing Service. (2021). Elementary education: Content knowledge 5018. Princeton, New Jersey.

Educational Testing Service. (n.d.). *About the Praxis Core.* https://www.ets.org/praxis/site/epp/about/core.html#:~:text=These%20tests%20measure%20academic%20skills,candidates%20entering%20teacher%20preparation%20program

Educational Testing Service. (n.d.). *About. https://www.ets.org/about.html*

Elpus, K. (2015). Music teacher licensure candidates in the United States. Journal of Research in Music Education, 63, 314 - 335. https://doi.org/10.1177/0022429415602470

Fass-Holmes, Barry. (2022). Survey Fatigue—What Is Its Role in Undergraduates' Survey Participation and Response Rates? *Journal of Interdisciplinary Studies in Education*, 11(1), 56–73. https://www.ojed.org/index.php/jise

Goldhaber, D., & Hansen, M. (2010). Race, gender, and teacher testing: How informative a tool is teacher licensure testing? *American Educational Research Journal*, 47(1), 218–251. https://doi.org/10.3102/0002831209348970

Hart, T., "Interventions to Increase Prospective Teacher Candidates' Praxis II Content Exam Scores" (2021). All Dissertations. 2958. https://tigerprints.clemson.edu/all_dissertations/2958

Holland, D. F., Kraha, A., Zientek, L. R., Nimon, K., Fulmore, J. A., Johnson, U. Y., Ponce, H. F., Aguilar, M. G., & Henson, R. K. (2018). Reliability generalization of the motivated strategies for learning questionnaire: A Meta-analytic view of reliability estimates. SAGE Open, 8(3), 215824401880233. https://doi.org/10.1177/2158244018802334

Hooshyar D., Pedaste, M., Saks, K., Leijen, A, Bardone, E., & Wang, M. (2020). Open student models in supporting self-regulated learning in higher education: A systematic literature review. *Computers & Education, 154*, doi: 10.1016/j.compedu.2020.103878

Hou, Y. (2020). Implications of AES system of Pigai for self-regulated learning. *Theory and Practice in Language Studies, 10*(3), 261.

https://doi.org/10.3389/fpsyg.2018.00259

Hudesman, J., Flugman, B., Hazelwood-Carter, K., Millet, N. (2022). A Self-Regulated Learning and Formative Assessment Program to Improve Student Achievement in Developmental Mathematics: Shifting from Paper and Pencil to Computerization. Academia Letters, Article 5205. https://doi.org/10.20935/AL5205.

Irvine, S., Williams, B., Özmen, M., & Mckenna, L. (2019). Exploration of self-regulatory behaviours of undergraduate nursing teacher candidates learning to teach: A social cognitive perspective. *Nurse Education in Practice*, *41*. https://doi.org/10.1016/j.nepr.2019.102633

Jansen, R. S., Van Leeuwen, A., Janssen, J., Jak, S., & Kester, L. (2019). Self-regulated learning partially mediates the effect of self-regulated learning interventions on achievement in higher education: A meta-analysis. *Educational Research Review*, *28*, 100292. 10.1016/j.edurev.2019.100292

Josephat, P., Ame ,A. Effect of Testing Logistic Regression Assumptions on the Improvement of the Propensity Scores, *International Journal of Statistics and Applications*, Vol. 8 No. 1, 2018, pp. 9-17. doi: 10.5923/j.statistics.20180801.02.

Kang H. The prevention and handling of the missing data. Korean J Anesthesiol. 2013 May;64(5):402-6. doi: 10.4097/kjae.2013.64.5.402. Epub 2013 May 24. PMID: 23741561; PMCID: PMC3668100.

Khalil, M. K., Hawkins, H. G., Crespo, L. M., & Buggy, J. (2017). The design and development of prediction models for maximizing teacher candidates' academic achievement. *Medical Science Educator*, *28*(1), 111–117. https://doi.org/10.1007/s40670-017-0515-0

Khalil, M. K., Williams, S. E., & Hawkins, H. G. (2019). The Use of Learning and Study Strategies Inventory (LASSI) to Investigate Differences Between Low vs High Academically Performing Medical Teacher candidates. *Medical Science Educator*, *30*(1), 287–292. https://doi.org/10.1007/s40670-019-00897-w

Khampirat, B. (2021). Validation of motivated strategies for learning questionnaire: Comparison of three competing models. *International Journal of Instruction*, *14*(2), 609–626. https://doi.org/10.29333/iji.2021.14234a

Khiat, H., & Vogel, S. (2022). A self-regulated learning management system: Enhancing performance, motivation, and reflection in learning. *Journal of University Teaching & Learning Practice, 19*(2), 43-59. https://doi.org/10.53761/1.19.2.4

Kimber, C. T. (2009). *The effect of training in self -regulated learning on math anxiety and achievement among preservice elementary teachers in a freshman course in mathematics concepts. [*Doctoral Dissertation]. Doctor of Education. Temple University. https://www.proquest.com/dissertations-theses/effect-training-self-regulated-learning-on-math/docview/305016970/se-2

Kizilcec, R. F., & Cohen, G. L. (2017). Eight-minute self-regulation intervention raises educational attainment at scale in individualist but not collectivist cultures. *Proceedings of the National Academy of Sciences*, *114*(17), 4348–4353. https://doi.org/10.1073/pnas.1611898114

Klassen, R. M., Kim, L. E., Rushby, J. V., & Bardach, L. (2020). Can we improve how we screen applicants for initial teacher education? *Teaching and Teacher Education*, *87*, 102949. https://doi.org/10.1016/j.tate.2019.102949

Kreitchmann, R. S., Abad, F. J., Ponsoda, V., Nieto, M. D., & Morillo, D. (2019). Controlling for response biases in self-report scales: Forced-choice vs. Psychometric Modeling of Likert items. *Frontiers in Psychology*, *10*. https://doi.org/10.3389/fpsyg.2019.02309

Kustandi, C., Wargahadibrata, H., Fadhillah, D. N., & Nursetyo, K. I. (2020). Flipped classroom for improving self-regulated learning of pre-service teachers. *International Journal of Interactive Mobile Technologies*, 14(9), 110-127.

Laer, S. V., & Elen, J. (2019). The effect of cues for calibration on teacher candidates' self-regulated learning through changes in teacher candidates' learning behaviour and outcomes. *Computers & Education, 135*, 30-48. doi: 10.1016/j.compedu.2019.02.016

Laer, Stijn Van, & Elen, Jan. (2019). The effect of cues for calibration on teacher candidates' self-regulated learning through changes in teacher candidates' learning behaviour and outcomes. *Computers & Education*, 135, 30-48. doi: 10.1016/j.compedu.2019.02.016

Latiker, T., Washington, R., Johns, J., Jackson, B., & Johnson, L. (2013). An examination of African American Student Praxis I preparation practices and their impact on matriculation at a historically African American university. *Researcher: An Interdisciplinary Journal, 26*(2), 59-75. https://doi.org/10.1108/JME-01-2017-0004

Li, J., Ye, H., Tang, Y., Zhou, Z., & Hu, X. (2018). What are the effects of self-regulation phases and strategies for Chinese teacher candidates? A meta-analysis of two decades of research of the Association between self-regulation and academic performance. *Frontiers in Psychology, 9*. doi:10.3389/fpsyg.2018.02434

Linda Rikard & Luanne Norden (2006) Winning Strategies for Passing Praxis I and II, Journal of Physical Education, Recreation & Dance, 77:3, 44-47, DOI: 10.1080/07303084.2006.10597844

Locke, E. A., & Latham, G. P. (2006). New directions in goal-setting theory. *Current Directions in Psychological Science*, *15*(5), 265–268. https://doi.org/10.1111/j.1467-8721.2006.00449.x

Mega, C., Ronconi, L., & Beni, R. D. (2014). What makes a good student? How emotions, self-regulated learning, and motivation contribute to academic achievement. *Journal of Educational Psychology*, *106*(1), 121–131. https://doi.org/10.1037/a0033546

Mega, C., Ronconi, L., & Beni, R. D. (2014). What makes a good student? How emotions, self-regulated learning, and motivation contribute to academic achievement. *Journal of Educational Psychology*, *106*(1), 121–131. https://doi.org/10.1037/a0033546

Memphis State University. (1970). *Memphis State University Bulletin 1970.*

Memphis State University. (1984.). *Memphis State University Bulletin 1984.*

Mentzer, G. A., Czerniak, C. M., & Duckett, T. R. (2019). Comparison of two alternative approaches to quality stem teacher preparation: Fast-track licensure and Embedded Residency Programs. *School Science and Mathematics*, *119*(1), 35–48. https://doi.org/10.1111/ssm.12314

Minnick, C., Warren, I. L., Ingram, R., Russell, C. S., & Warren, P. (2013). Traditional teacher candidates and adult teacher candidates (non-traditional) teacher candidates: Is there a difference in high stakes test scores? *Review of Higher Education & Self-Learning*, *6*(20), 48–56.

Ndembera, R. Hao, J.,Fallin,R.,Ray, H., Shah, L. & Rushton, G. (2021) Demographic factors that influence performance on the Praxis Earth and Space Science: content knowledge test, *Journal of Geoscience Education*, 69:4, 401-410, DOI: 10.1080/10899995.2020.1813866

Nettles, M., Scatton, L., Steinberg, J., & Tyler, L. (2011). Performance and passing rate differences of African American and White prospective teachers on Praxis examinations

(ETS Research Report No. 11-08). Princeton, NJ: Educational Testing Service. http://eric.ed.gov/?id=ED523733

Olivari, Maria & Bonanomi, Andrea & Gatti, Elena & Confalonieri, Emanuela. (2015). Psychometric properties of the Motivated Strategies for Learning Questionnaire (MSLQ) among Italian high school teacher candidates. Conference: The 14th European Congress of Psychology. Milan, Italy. https://www.researchgate.net/publication/281404020_psychometric_properties_of_the_motivated_strategies_for_learning_questionnaire_mslq_among_italian_high_school_teacher candidates/stats

Pallant, J. (2001). *Spss survival guide: A step by step guide to data analysis using Spss for windows (version 10)*. Allen & Unwin.

Panadero, E. (2017). A review of self-regulated learning: Six models and four directions for research. *Frontiers in Psychology, 8.* https://10.3389/fpsyg.2017.00422

Panadero, E. (2017). A review of self-regulated learning: Six models and four directions for research. *Frontiers in Psychology, 8.* https://10.3389/fpsyg.2017.00422

Peel, K. L. (2020). Everyday classroom teaching practices for self-regulated learning. *Issues in Educational Research, 30*(1), 260-282. https://search.informit.org/documentSummary;dn=086252042580660;res=IELHSS

Petchauer, E. (2016). Shall we overcome? Self-efficacy, teacher licensure exams, and African American preservice teachers. *The New Educator, 12*(2), 171-190. https://10.1080/1547688X.2016.1156456

Petchauer, E. (2018). I will not fail: How African American preservice teachers succeed on licensure exams after initially failing. *The Educational Forum, 82*(4), 443-460. https://10.1080/00131725.2018.1478051

Pintrich, P. R. (2000). *The role of goal orientation in self-regulated learning.* In Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (p. 451–502). Academic Press. https://doi.org/10.1016/B978-012109890-2/50043-3

Pintrich, P. R. (2000). The role of goal orientation in self-regulated learning. In Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (p. 451–502). Academic Press. https://doi.org/10.1016/B978-012109890-2/50043-3

Polzin, E. (2018). *A Correlational Study of Academic Locus of Control, Study Preparation, and the Praxis II* (Doctoral dissertation, Lindenwood University).

Pritchard, J., Masters, K., Allen, J., Contenta, F., Huckvale, L., Wilkins, S., & Zocchi, A. (2014). Asking gender questions. Astronomy & Geophysics, 55(6), 6-8. https://doi.org/10.1093/astrogeo/atu245

Puspitasari, K. (2012). *The effects of learning strategy intervention and study time management intervention on teacher candidates' self-regulated learning, achievement, and course completion in a distance education learning environment* (Doctoral Dissertation). ProQuest Dissertations & Theses Global.

Puspitasari, K. (2012). *The effects of learning strategy intervention and study time management intervention on teacher candidates' self-regulated learning, achievement, and course completion in a distance education learning environment* (Doctoral Dissertation). ProQuest Dissertations & Theses Global.

Putnam, H., Walsh, K. (2019). *A fair chance: Simple steps to strengthen and diversify the teacher workforce.* National Council on Teacher Quality (NCTQ). https://www.nctq.org/publications/A-Fair-Chance

Putnam, H., Walsh, K. (2019). *A fair chance: Simple steps to strengthen and diversify the teacher workforce.* National Council on Teacher Quality (NCTQ). https://www.nctq.org/publications/A-Fair-Chance

Rikard, L. & Norden, L. (2006) Winning Strategies for Passing Praxis I and II, Journal of Physical Education, Recreation & Dance, 77:3, 44-47, DOI: 10.1080/07303084.2006.10597844

Roberts, T. (2022). Grow your own: Recommendations for addressing teacher shortages for stem and other critical needs areas. *Current Urban Studies*, *10*(04), 611–618. https://doi.org/10.4236/cus.2022.104036

Sahranavard, S., Miri, M. R., & Salehiniya, H. (2018). The relationship between self-regulation and educational performance in teacher candidates. *Journal of education and health promotion*, *7*,154. https://doi.org/10.4103/jehp.jehp_93_18

Sebesta, A. J., & Bray Speth, E. (2017). How should I study for the exam? Self-regulated learning strategies and achievement in introductory biology. *CBE Life Sciences Education, 16*(2). https://10.1187/cbe.16-09-0269

Sischka, P. E., Décieux, J. P., Mergener, A., Neufang, K. M., & Schmidt, A. F. (2022).

State Requirements. n.d. Retrieved September 06, 2020, from https://www.ets.org/praxis/states

Stephen JS, Rockinson-Szapkiw AJ. A high-impact practice for online students: the use of a first-semester seminar course to promote self-regulation, self-direction, online learning

self-efficacy. Smart Learn. Environ. 2021;8(1):6. doi: 10.1186/s40561-021-00151-0. Epub 2021 May 7. PMCID: PMC8102848.

Sundstrom, E. D., Hardin, E. E., & Shaffer, M. J. (2016). Extra Credit Micro-Incentives and Response Rates for Online Course Evaluations: Two Quasi-Experiments. Teaching of Psychology, 43(4), 276–284. https://doi.org/10.1177/0098628316662754

Tennessee Department of Education. (2018). *EPP Newsletter Update:edTPA information for Districts. https://www.tn.gov/content/dam/tn/education/licensure/ed-prep/edTPA_Info_for_Districts_508CR.pdf*

Theobald, M. (2021). Self-regulated learning training programs enhance university teacher candidates' academic performance, self-regulated learning strategies, and motivation: A meta-analysis. https://doi.org/10.31234/osf.io/tf8nk

Thobega, M., & Miller, G. (2008). Predicting scores of beginning agricultural education teachers on the Praxis II examination. Journal of Agricultural Education, 49(1), 99-109.

Tyler, L., Whiting, B., Ferguson, S., Eubanks, S., Steinberg, J., Scatton, L., & Bassett, a. K. (2011). Toward increasing teacher diversity: Targeting support and intervention for teacher licensure candidates. Education Testing Service; National Education Association, 1-27.

United States Department of Education (2021).*2021 Title II Report: Academic Year 2019-2020 Data https://title2.ed.gov/Public/Home.aspx*

Verma, P., Ahuja, N. J., & Hermon, G. B. (2019). Past and present of self-regulated learning (SRL) in the digital learning environment (DLE): A meta-empirical review. *Journal of Computer Engineering & Information Technology, 2018.* https://10.4172/2324-9307.1000210

Wang, Y. & Sperling, R. A. (2020). Characteristics of effective self-regulated learning interventions in mathematics classrooms: A systematic review. *Frontiers in Education, 5,* https://10.3389/feduc.2020.00058

Wilson, A. (1985). Knowledge for Teachers: Knowledge, for Teachers: The Origin of the National Teacher Examinations Program. the Annual Meeting of the 'American Educational Research Association (69th, Chicago, IL, March 31-April 4, 1985). https://files.eric.ed.gov/fulltext/ED262049.pdf

Wynter-Hoyte, K., Long, S., Mcadoo, T. M., & Strickland, J. D. (2020). "Losing One African American Preservice Teacher is One Too Many": A Critical Race Analysis of Support for Praxis Core as African American Teacher Candidates Speak Out. Teachers College Record. https://doi.org/10.1177/016146812012201107

Yip, M. C. (2019). The linkage among academic performance, learning strategies and self-efficacy of Japanese university teacher candidates: A mixed-method approach. *Studies in Higher Education*, *46*(8), 1565–1577. https://doi.org/10.1080/03075079.2019.1695111

Zheng, L. (2016). The effectiveness of self-regulated learning scaffolds on academic performance in computer-based learning environments: A meta-analysis. *Asia Pacific Education Review, 17*(2), 187-202. doi:10.1007/s12564-016-9426-9

Zimmerman, B. J. (1989). A social cognitive view of self-regulated academic learning. *Journal of Educational Psychology*, *81*(3), 329–339. https://doi.org/10.1037/0022-0663.81.3.329

Zimmerman, B. J. (1990). Self-Regulated Learning and Academic Achievement: An Overview. Educational *Psychologist, 25*(1), 3-17.

Zimmerman, B. J. (2002). Becoming a self-regulated student: An overview. *Theory into Practice*, 41(2), 64-70.

Zimmerman, B. J. (2008). Investigating self-regulation and motivation: Historical background, methodological developments, and future prospects. *American Educational Research Journal*, *45*(1), 166–183. https://doi.org/10.3102/0002831207312909

Zurita Ortega, F., Martinez, A., Chacon Cuberos, R., & Ubago Jiménez, J. L. (2019). Analysis of the Psychometric Properties of the Motivation and Strategies of Learning Questionnaire—Short Form (MSLQ-SF) in Spanish Higher Education Teacher candidates. *Social Sciences*, *8*(5), 132. MDPI AG. Retrieved from http://dx.doi.org/10.3390/socsci8050132

Appendix A

MSLQ Questions Adapted for Praxis Preparation

Praxis Preparation Student Questionnaire

Start of Block: Default Question Block

You are being asked to participate in a research study. The box below highlights key information for you to consider when deciding if you want to participate. More detailed information is provided below the box. Please ask the researcher(s) any questions about the study before you make your decision. If you volunteer, you will be one of about 400 people to do so.

Key Information for You to Consider
Voluntary Consent: You are being asked to volunteer for a research study. It is up to you whether you choose to participate or not. There will be no penalty or loss of benefit to which you are otherwise entitled if you choose not to participate or discontinue participation. **Purpose:** The purpose of this research is to examine whether undergraduate and graduate teacher candidates' levels of self-regulation predict whether teacher candidates pass or fail the Praxis I Core and Praxis II Content examinations, controlling for the age, race, traditional/non-traditional status. **Duration:** It is expected that your participation will last 10-15 minutes. Procedures and Activities: You will be asked to answer questions using a computer-delivered survey. The survey will include demographic questions, as well as questions adapted from the Motivated Strategies for Learning Questionnaire (MSLQ). You will also be asked to give permission to access your Praxis examination scores. **Risk:** Some of the foreseeable risks or discomforts of your participation include disclosing personal information about your demographics, test-taking experience, and performance on the Praxis examination. **Benefits:** Some of the benefits that may be expected include focused Praxis preparation support. An indirect benefit that may be expected is the expansion of Praxis supports for future cohorts of pre-service teachers that is developed, in part, by the findings of this study. Participants who complete the survey will also be automatically entered to win one of five $5 Amazon gift cards (5 in 400 chance of winning). After the survey has closed, a respondent will be randomly selected using the email provided on the survey. Alternatives: Participation is voluntary, and the only alternative is to not participate.

Who is conducting this research?

Ayanna Perkins of the University of Memphis, Department of Teacher Education and Clinical Practice is in charge of the study. Her faculty advisor is Dr. Amanda Rockinson-Szapkiw. Dr. Nichelle Robinson is the Director of Teacher Education and Clinical Practice. There may be other research team members assisting during the study. Ayanna Perkins works directly with pre-service teachers to secure their Clinical Placements.

What happens if I agree to participate in this research?

If you agree, you will be asked to take a brief, 10-15minute anonymous Qualtrics survey, which will ask for your demographic information and your experience preparing for the Praxis examination. You may have taken multiple Praxis examinations, or you may not have taken a Praxis examination yet. Please consider your general approach to studying and preparation for examinations. You will be provided with a list of questions in advance. As a part of this study, we also ask for permission to access your Praxis scores. If you choose not to participate in the survey after reviewing the questions, you can stop anytime.

If you agree to be contacted for future studies regarding Praxis preparation, then we may contact you when future studies commence.

What happens to the information collected for this research?

Information collected for this research will be used to publish a predictive study on the factors that predict success or failure on the Praxis examination. Your name will not be used in any publications or conferences.

How will my privacy and data confidentiality be protected?

We promise to protect your privacy and secure your personal information as best we can, although you need to know about some limits to this promise. Measures we will take include:

- The data will be stored for up to 24 months on a password-protected University database.
- The Praxis information from Argos will be linked to the survey information via UUID. Once that data is linked, the identifiable information will be destroyed.
- Research will be conducted in a private setting and/or other space considerations using the secure Qualtrics system.
- The data will be analyzed using SPSS on the University's VPN system.
- The survey is anonymous. The U-Number will be removed from statistical analysis.
- Praxis records from Educational Testing Services (ETS) are reported in the secure university Bannerweb system.

Individuals and organizations that monitor this research may be permitted access to inspect the research records. This monitoring may include access to your private information and ETS records. These individuals and organizations include the Institutional Review Board and other university entities.

Will it cost me money to take part in this research?

There are no costs associated with participation in this research study.

Will I receive any compensation or reward for participating in this research?

You will not be compensated for taking part in this research.

Who can answer my question about this research?

Before you decide to volunteer for this study, please ask any questions that might come to mind. Later, if you have questions, suggestions, concerns, or complaints about the study, you can contact the investigator, Ayanna Perkins at prkins10@memphis.edu or Dr. Amanda Rockinson-Szapkiw at rcknsnsz@memphis.edu. If you have any questions about your rights as a volunteer in this research, contact the Institutional Review Board staff at the University of Memphis at 901-678-2705 or email irb@memphis.edu. We will give you a signed copy of this consent to take with you.

STATEMENT OF CONSENT

I have had the opportunity to consider the information in this document. I have asked any questions needed for me to decide about my participation. I understand that I can ask additional questions throughout the study.

By clicking below, I volunteer to participate in this research. I understand that I am not waiving

any legal rights. I have been given a copy of this consent document. I understand that if my ability to consent for myself changes, my legal representative or I may be asked to consent again prior to my continued participation.

- o I consent to participate in this research.
- o I do not consent to participate in this research.

End of Block: Default Question Block

Start of Block: Part 1: Demographics

Q1: Please enter your complete Unumber (Ex. U00709000)

UNumber (1)

_____

Q2: Gender

- o Male
- o Female
- o Non-binary / third gender
- o Prefer Not to Say

Q3: Are you a first-generation college student? Ex. Parents did not complete more than two years of college.

- o Yes
- o No

Q4 Which statement best describes you?

- o Traditional: Enrolled directly from high school and/or under 25 years old
- o Non-traditional/Post-Traditional: Did not enroll directly from high school and/or over 25 years old

Q6 Please select your student status:

- o Full-time (12+ credit hours)
- o Part-time (fewer than 12 credit hours)

Q7 Please select your classification:

- o Freshman
- o Sophomore
- o Junior
- o Senior
- o Graduate

Q8 Please select your program.

- Art Education
- English as a Second Language
- Human Development and Learning (Pre-K-3)
- Integrative Studies: Secondary Math
- Master of Arts in Teaching
- Music Education
- Physical Education
- Teaching All Teacher candidates (K-5)
- Other (9)

Q9: Ethnic background

- American Indian or Alaska Native
- Asian
- African American or African American
- Hispanic/Latino
- Multiracial
- Native Hawaiian or Other Pacific Islander
- White
- A race/ethnicity not listed here

Q10: Are you interested in participating in future studies related to Praxis preparation?

Yes
No

End of Block: Part 1: Demographics

1.I prefer to study material that is challenging so I can learn new things.
2. Compared to other teacher candidates, I expect to do well on the Praxis examination.
3. I am so nervous during a test that I cannot remember the facts that I have learned.
4.It is important for me to learn the material on the Praxis examination.
5. I like the subject matter of the Praxis examination.
6. I am certain that I can understand the ideas presented on the Praxis examination.
7. I think I will be able to use what I learn from the Praxis Examination in classes.
8. I expect to do very well on the Praxis Examination.
9. Compared with others, I think that I am a good student.
10. I often choose paper topics I can learn something from, even if they require more work.
11. I am sure I can do an excellent job on the problems and tasks covered on the Praxis examination.
12. I have an uneasy, upset feeling when I take a test.
13. I think that I will receive a good score on the Praxis Examination.
14. Even when I do poorly on a test, I try to learn from my mistakes.
15. I think that what is covered on the Praxis examination is useful for me to know.
16. My study skills are excellent compared to others.

17. I think that what I am learning about the content areas that the Praxis examinations cover is interesting.
18. Compared with other teacher candidates, I think I know a great deal about the Praxis examination subjects.
19. I know that I will be able to learn the material for the Praxis examination.
20. I worry a great deal about tests.
21. Understanding the Praxis examination is important to me.
22. When I take a test, I think about how poorly I am doing.
23. When I study for a test, I try to put together the information from classes and from books.
24. When I do homework, I try to remember what the teacher said in class so I can answer the questions correctly.
25. I ask myself questions to make sure I know the material I have been studying.
26. It is hard for me to decide what the main ideas are in what I read.
27. When work is hard, I either give up or study only the easy parts.
28. When I study, I put important ideas into my own words.
29. I always try to understand what the study material is saying even if it doesn't make sense.
30. When I study for a test, I try to remember as many facts as I can.
31. When studying, I copy my notes over to help me remember material.
32. I work on practice exercises and answer end of chapter questions even when I don't have to.
33. Even when study materials are dull and uninteresting, I keep working until I finish.
34. When I study for a test, I practice saying the important facts over and over to myself.
35. Before I begin studying, I think about the things I will need to do to learn.
36. I use what I have learned from old homework assignments and the textbook to do new assignments.
37. I often find that I have been reading for class, but don't know what it is all about.
38. I find that when a teacher is talking, I think of other things and don't really listen to what is being said.
39. When I am studying a topic, I try to make everything fit together.
40. When I'm reading, I stop once in a while and go over what I have read.
41. When I read materials for this class, I say the words over and over to myself to help me remember.
42. I outline the chapters in books to help me study.
43. I work hard to get a good grade even when I don't like a class.
44. When reading, I try to connect the things I am reading about with what I already know.

Appendix B

Scale Correlations (Pintrich &DeGroot; 1990, p.)

Table 1
Summary Statistics and Zero-Order Correlations for Motivation and Self-Regulated Learning Variables

Variable	1	2	3	4	5
1. Intrinsic value	—				
2. Self-efficacy	.48*	—			
3. Test anxiety	−.01	−.34*	—		
4. Strategy use	.63*	.33*	.04	—	
5. Self-regulation	.73*	.44*	−.13	.83*	—
M	5.44	5.47	3.58	5.20	5.03
SD	0.89	1.00	1.67	0.77	0.83

Note. $N = 173$.
* $p < .001$.