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Personality Type, Self-Efficacy, and Learning Style Preference: A Quantitative Study of Ninth-Grade Students in Missouri

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Personality Type, Self-Efficacy, and Learning Style Preference:

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by

Katie Lee Mock

July 27, 2020

A Dissertation submitted to the Education Faculty of Lindenwood University in

partial fulfillment of the requirements for the degree of

Doctor of Education

School of Education

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This Dissertation has been approved as partial fulfillment

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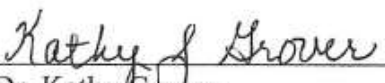_____   _____
Dr. Kathy Grover   7-27-2020
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Declaration of Originality

I do hereby declare and attest to the fact that this is an original study based solely upon my own scholarly work at Lindenwood University and that I have not submitted it for any other college or university course or degree.

Full Legal Name: Katie Lee Mock

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Abstract

Personality types, learning style preferences, and self-efficacy domains of ninth-grade students in southwest Missouri were explored in this study. The study was conducted to shed light on needs assessments used to identify learner differences due to the rise of mixed-ability classrooms. Five selected schools participated in the study during the 2019-2020 school year. The Big Five Personality survey was used to identify the dominant personality type of each participant: openness, conscientiousness, extroversion, agreeableness, or neuroticism. The Self-Efficacy Questionnaire for Children (SEQ-C) was used to identify the dominant self-efficacy domain for each participant: academic, social, or emotional. The Thinking and Learning Styles survey was used to identify the dominant learning style preference for each participant: visual, auditory, or kinesthetic. A total of 148 high school students completed the survey. Following a quantitative analysis using the chi-square goodness-of-fit test, significant differences between personality type and learning style preference, self-efficacy and learning style preference, and personality type and self-efficacy were found. The most-significant difference between personality type and learning style preference was agreeableness and kinesthetic. The most-significant difference between self-efficacy and learning style preference was social and kinesthetic. Lastly, the most-significant difference between personality type and self-efficacy was agreeableness and social. The data collected and conclusions drawn from this study will help researchers build on an increasing trend of learner diversity and will enable educators to employ the pedagogy of differentiated instruction with fidelity.

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Chapter One: Introduction

The belief every student deserves equal opportunities in the academic arena is an international imperative (Strogilos, Tragoulia, Avramidis, Voulagka, & Papanikolaou, 2017). Educators are daunted by the task of ensuring all students meet the standards of the state, district, or school despite the fact students possess differing abilities, learning style preferences, and personalities (Birnie, 2015). Differentiated instruction is encouraged to deliver pedagogy based on students' needs and abilities to increase autonomy, motivation, and perceived competence (Guay, Roy, & Valois, 2017).

The major topics addressed in this chapter include the progression of differentiated instruction over the last century, the increase in learner diversity, and the awareness of pre-assessment tools used to analyze learner differences. Educators in differentiated classrooms provide scaffolding techniques to enable the greatest possible number of students to learn content from meaningful experiences (Tomlinson, 2017). According to Kharb, Samanta, Jindal, and Singh (2013), knowledge of students' learning style preferences can enhance the educational environment and increase student motivation. Additionally, if students are aware of their learner preferences, they are more likely to become autonomous, life-long learners (Kharb et al., 2013).

This chapter includes background information on the history of differentiated instruction. The conceptual model of differentiated instruction was chosen as the framework for this study and was used in the development of research questions. The problem statement, purpose of the study, research questions, and significance of the study are outlined. Finally, the chapter includes the definition of key terms utilized in the

research and the delimitations, limitations, and assumptions regarding the participants, demographics, and instrumentation.

Background of the Study

The idea of differentiated instruction began as early as the 1900s when Binet developed the first intelligence test, which focused attention on individual differences (Binet & Simon, 1916). Shortly after, Montessori (1912), who developed the Montessori Method of Education, asserted students gain knowledge through their actions, and she advocated against multiple-choice testing. The term *participatory learning* was also coined in the early 1900s by Dewey (1962), who believed educators should design authentic instruction to relate directly to the lives of students.

During the 1970s, the concept of individualized learning emerged as an avenue of pedagogy to cater to the unique learning style preferences of students (Sreenidhi & Helena, 2017). One of the most popular ideas in this decade for differentiated instruction was the Enrichment Triad Model put forth by Renzulli (2016). Renzulli (2016) offered to expand unique educational opportunities traditionally reserved for gifted students to all students to capitalize on students' talents, passions, and interests. The Dunn and Dunn learning style model from the 1970s involved instrumentation to assess visual, auditory, and kinesthetic learning styles, which brought awareness to the idea that instructional methods could be tailored to learning style preferences (Dunn et al., 2008).

According to Subban (2006), Vygotsky's socio-cultural theory began a shift in education toward differentiated instruction and introduced the benefits of meaningful and collaborative relationships between students and teachers. Using the zone of proximal development, Vygotsky (1978) supported the concept of differentiated instruction and

encouraged educators to vary instructional strategies to ensure each student masters content with the appropriate amount of guidance and support.

In the early 1980s, Kolb's learning style model, developed from his learning style inventory, exemplified instrumentation relating personality to learning (Peterson & Kolb, 2017). Kolb, through his experiential learning theory, introduced the importance of identifying and catering to individual learning style preferences in connection with all aspects of life (Peterson & Kolb, 2017). Additionally, the practice of experiential learning encompasses authentic student-centered practices and real-life experiences (Peterson, DeCato, & Kolb, 2015). In 1986, Bandura (1994), through his social cognitive theory, claimed people are a part of their environments; therefore, choices people make shape their interests, competencies, careers, and life paths. Bandura (1994), an expert in self-efficacy, declared students gain self-efficacy by experiencing successful performances (Alqurashi, 2016; Schunk & DiBenedetto, 2016).

The 1990s were defined by an emphasis on incorporating all learning styles during instruction to give every student an equal chance to learn (Sreenidhi & Helena, 2017). Ackerman's PPKI theory (intelligence as processes, personality, knowledge, and interests) promoted the idea that personality plays a critical role in individual choice, persistence, and engagement (Azadipour, 2019). This decade was also considered a renewed era of literacy (Cassidy, Ortlieb, & Grote-Garcia, 2016) and differentiation of levels of reading with authentic experiences using students' zone of proximal development (Stover, Sparrow, & Siefert, 2016). Using the theory of vocational choice, Holland created a hexagonal inventory composed of occupational classifications (Holland & Whitney, 1968). Holland's work laid the foundation for secondary and post-secondary

counselors to assist in matching career choices to personality type and psychological readiness (Holland & Whitney, 1968).

In 1992, Costa and McCrae developed the Neuroticism-Extraversion-Openness Inventory (NEO-I), later adding the personality traits of agreeableness and conscientiousness, which redefined the Big Five personality traits originally put forth by Goldberg (Costa & McCrae, 2008). Also popular during this time was Gardner's theory of multiple intelligences, which focused on specific intelligences and postulated teachers must use differentiation to provide opportunities for inclusion of all students through multiple techniques and assessments (Gardner & Hatch, 1989).

Currently, education is progressing from a teacher-centered to a student-centered environment (Farkas, Mazurek, & Marone, 2016; Sreenidhi & Helena, 2017). Student-centered pedagogy is fostered through supportive relationships and a positive learning environment, both of which increase student autonomy (Moate & Cox, 2015). Dunn et al. (2008) asserted, "To teach effectively, instructors must know how to teach individuals on the basis of their brain processing, environmental requirements, sociological inclinations, perceptual strengths, and interests or talents" (p. 139). Today, teachers who utilize differentiated instruction see themselves as collaborators with their students and are always conscious of learner diversity (Tomlinson, 2017).

Conceptual Framework

The framework that guided this study was the conceptual model of differentiated instruction, which includes an analysis of characteristics to differentiate pedagogy (Tomlinson, 2017). Tomlinson (2017) explained, "In a differentiated classroom, the teacher proactively plans and carries out varied approaches to content, process, and

product in anticipation of and response to student differences in readiness, interest, and learning needs" (p. 10). The aim of differentiated instruction is to adjust one's teaching methods so lessons can accurately reflect the unique needs of all students (Freedman, 2015; Marghitan, Tulbure, & Gavrila, 2016). According to Ismajli and Imami-Morina (2018), instructors get to know their students better through observation, interactive strategies, cooperative learning, individual evaluation, and conversations with families.

Researchers have studied the effect of personality on learning processes, notably with the aid of a personality model nicknamed the "Big Five" (Khatibi & Khormaei, 2016). Psychologists have discovered evident correlations between personality type and learning style preferences (Baig & Ahmad, 2016). When students are knowledgeable of their preferred learning styles, they exhibit confidence in adapting to learning conditions (Puji & Ahmad, 2016).

In addition to being cognizant of personality types and learning style preferences, strong self-efficacy beliefs in students increase metacognitive awareness and can be important in predicting academic achievement (Köseoğlu, 2015). Teachers and administrators can raise academic self-efficacy in students by modeling and reinforcing time-management, self-regulation, and perseverance with difficult tasks; clarifying expectations; and giving ample feedback (Köseoğlu, 2015; Schunk & DiBenedetto, 2016). At the classroom level, there is an urgency for teachers to incorporate principles of differentiation into their practice to create an environment that supports all students (Guay et al., 2017).

The conceptual framework of differentiated instruction was used as a guide to form the research questions for this study. Teachers can differentiate through multiple

avenues to attend to student needs (Tomlinson, 2017); therefore, the research questions were designed to focus on differences among student readiness, interests, and learning profiles. One facet of student readiness is academic self-efficacy, which is shown to have a significant relationship with students' self-directed learning and achievement motivation (Saeid & Eslaminejad, 2017). One aspect of students' interests is personality type, which is shown to have a strong correlation to cognitive styles (Phongploenpis & Samart, 2018). Learner style preference is a large component of learning profiles; researchers have revealed a significant difference between students' learning style preferences and metacognitive awareness (Baltaci, Yildiz, & Özcakir, 2016).

Statement of the Problem

Today's classrooms are populated with more diversity and mixed-ability students than ever before; consequently, it is recommended teachers implement constructivist learning theories such as differentiated instruction (Van der Walt, 2016). When teachers respect differences in learning profiles, the entire academic arena benefits (Baig & Ahmad, 2016). Tomlinson (2017) claimed:

> Differentiation calls on a teacher to realize that classrooms must be places where teachers pursue understandings of compelling teaching and learning every day and to remember that no practice is truly best practice unless it works for a particular learner. (p. 35)

An increase in academic performance is evident when lessons are delivered in a manner that allows students to feel comfortable and capable (Vasileva-Stojanovska, Malinovski, Vasileva, Jovevski, & Trajkovik, 2015).

Interestingly, Khatibi and Khormaei (2016) found understanding the effect of personality on learning processes provides opportunities for faculty to reflect on their teaching styles and practices. According to Djigić, Stojiljković, and Marković (2016), teachers can offer students individual support if they are aware of students' personality characteristics and learning style preferences. In addition to differentiating instruction with knowledge of students' personality types and learning style preferences, Schunk and DiBenedetto (2016) hypothesized that with awareness of student self-efficacy, "teachers can improve their students' emotional states and help correct faulty beliefs and habits of thinking, raise their academic skills and self-regulation, and alter the school and classroom structures to ensure student success" (p. 35). In addition, "research knowledge on how to positively influence self-efficacy should be put to use in classrooms and schools, teacher preparation programs, and educational policies" (Schunk & DiBenedetto, 2016, p. 50). In fact, Tomlinson (2017) reasoned teachers who differentiate learning understand the needs of their students before and after instruction.

Contradictory to findings that understanding of learning style preferences can contribute to more effective support of students through individualization of the learning process (Djigić et al., 2016; Khatibi & Khormaei, 2016), Cuevas (2015) stated there is a lack of research indicating that delivering content via different learning styles is beneficial; good teachers can vary the delivery of content without placing students into categories. According to Bernard, Chang, Popescu, and Graf (2017), learning style questionnaires can lose credibility due to the assumption learners are motivated to fill the questionnaires out truthfully; in addition, learning styles can change over time. Kirschner

(2017) indicated the use of learning style assessments to individualize instruction shows little validity, and he argued there are no beneficial outcomes for students or teachers.

On another note, Harlow, Harrison, Justason, Meyertholen, and Wilson (2017) found correlations between measured personality types and student performance and asserted their study would inspire other researchers to use an understanding of student personality types to improve pedagogy. Further, Kharb et al. (2013) reported most previous studies were conducted in other countries in the field of medicine, and there is limited knowledge about the relationship between student learning styles and preference for specific instructional strategies.

Purpose of the Study

The purpose of this study was to determine if there are significant differences among students' personality types, learning style preferences, and self-efficacy domains to increase awareness of metacognitive factors educators can use to differentiate instruction. Differentiated instruction provides an inclusive environment where effective pedagogy can meet the needs of all students (Freedman, 2015). According to Strogilos et al. (2017), educators who offer a differentiated environment respond to differences among learners. This study included an investigation of learner differences using three needs assessments used to help educators discover patterns in learner profiles.

Research questions and hypotheses. The following research questions and hypotheses guided the study:

1. What difference, if any, exists between student personality type and learning style preference?

$H1_0$: There is no statistically significant difference between student personality

type and learning style preference.

$H1_a$: There is a statistically significant difference between student personality type

and learning style preference.

2. What difference, if any, exists between student self-efficacy domain and

learning style preference?

$H2_0$: There is no statistically significant difference between student self-efficacy

domain and learning style preference.

$H2_a$: There is a statistically significant difference between student self-efficacy

domain and learning style preference.

3. What difference, if any, exists between student personality type and self-

efficacy domain?

$H3_0$: There is no statistically significant difference between student personality

type and self-efficacy domain.

$H3_a$: There is a statistically significant difference between student personality type

and self-efficacy domain.

Significance of the Study

This study addresses a gap in research through the collection of data from high

school students representing all socioeconomic backgrounds to determine the differences

among three independent variables: personality type, self-efficacy domain, and learning

style preference. Of importance, Obergriesser and Stoeger (2016) alleged, "Although

there is an extensive body of research on the effectiveness of cognitive and metacognitive

learning strategies… students' preferences for these strategies are not well understood"

(p. 5). Furthermore, limited information is available about the relationship between student learning style preference and preferred instructional methods (Kharb et al., 2013). Martin (2015) suggested, "Future studies will want to include schools with different ethnic and background demographics as well as include a broader socio-economic makeup" (p. 62). In addition, Köseoğlu (2015) professed further research is required to determine if self-efficacy and motivation together are predictors of academic achievement. Future researchers should explore other facets of individual differences such as self-efficacy (Köseoğlu, 2016)

Notably, Djigić et al. (2016) suggested identifying the relationship between students' personality traits and learning style preferences might allow teachers to provide a more individualized learning experience for students. Teachers who truly understand the characteristics, interests, and needs of each student develop trusting partnerships and propel students to become confident, motivated, and successful young adults (Tomlinson, 2017). The practice of recognizing learner characteristics and analyzing learner differences could optimize education for all students (Tahiri, Bennani, & Idrissi, 2017).

According to Khatibi and Khormaei (2016) and Puji and Ahmad (2016), becoming aware of one's learning style preference is empowering and can lead to self-confidence and increased achievement. In addition, Honicke and Broadbent (2016) suggested further research exploring the relationship between academic self-efficacy and academic achievement along with any mediating variables. Moreover, future researchers should explore how educators can adjust content delivery to meet the needs of students with different personality types (Murphy, Eduljee, Croteau, & Parkman, 2017). This investigation adds to an existing body of knowledge by addressing the increasing

diversity of the student population and shedding light on learner differences and needs assessments, both of which can be used to facilitate differentiation in public high schools.

It is essential for educators to understand the impact of a student's preferred learning style on academic achievement (Kharb et al., 2013). Specifically, Vedel (2015) claimed:

> By taking into account some general personality characteristics of student populations, teachers and instructors may be better equipped to the task of structuring the learning environment in a way that engages the students, makes them feel comfortable, and facilitates the learning process. (p. 8)

In fact, Kharb et al. (2013) stated, "Neuroscience research has also revealed that significant increases in learning can be accomplished when the learning environments cater to their (the students) predominant learning styles" (p. 6). Alignment among personality type, learning style preference, and instructional method could be necessary for ultimate student participation (Phongploenpis & Samart, 2018). This research provides practical applications for teachers to differentiate instruction in their classrooms, increase self-efficacy of students, and participate in professional development.

Definition of Key Terms

For the purposes of this study, the following terms are defined:

Differentiated instruction (DI). According to Tomlinson (2017), differentiated instruction "provides avenues to acquiring content, to processing or making sense of ideas, and to developing products so that each student can learn effectively" (p. 1).

Diverse learner. According to Prithishkumar and Michael (2014), a diverse learner is a distinction based on the following factors: a student's interest in the topic,

motivation to the subject, individual principle, active participation, affective domain (including personality traits and self-efficacy), and preferred learning styles.

Flexible grouping. Flexible grouping is a pedagogical style that places students in short-term groups based on learning needs and lesson goals; flexible groups form and frequently dissipate as learner needs are met (Hollas, 2007).

Multiple intelligences theory (MI). According to Ahvan and Pour (2016), "Multiple intelligences theory promotes the idea that every individual is capable of learning through the range of different intelligences" (p. 141). Ahvan and Pour (2016) stated these intelligences include logical-mathematical, verbal-linguistic, visual-spatial, intrapersonal, bodily-kinesthetic, interpersonal, naturalistic, and music intelligences.

Tiered assignments. Tiered assignments are a series of related tasks given to students based on readiness levels and skills needed to master a concept; ongoing assessment is used to adjust the tasks as needed (Shparyk, 2017).

Delimitations, Limitations, and Assumptions

The scope of the study was bounded by the following delimitations:

Time frame. The surveys used for data collection were distributed during the fall semester of 2019 and the spring semester of 2020.

Location of study. The location of the study included five high school campuses in southwest Missouri.

Sample. The participants included ninth-grade students enrolled in public school systems.

Criteria. Only ninth-grade students who returned the Lindenwood Consent on Behalf of a Minor Form and the Lindenwood University Student Assent form were

considered. For surveys completed after February 18, 2020, the Student Assent form was part of the digital survey; the students were required to click "I consent" at the beginning of the survey to complete the survey.

The following limitations were identified in this study:

Sample demographics. The study was limited to five public school districts located in three counties in southwest Missouri.

Instrument. The survey items were restricted to items on the version of each survey sent to students.

Time of day. The surveys were completed during the time of day logistically suited to the schedule of each high school participating.

The following assumptions are identified in this study:

Responses of participants. It is assumed the participants' responses to the surveys were honest and without bias. To obtain the most honest responses possible, anonymity was ensured (Safdar, Abbo, Knobloch, & Seo, 2016).

Sample population. It is assumed the sample was representative of the population chosen for this study.

Summary

School vision and mission statements across the globe refer to meeting the needs of all learners to provide equity in school systems (Millen & Gable, 2015). However, most teachers lack a universal understanding of differentiated instruction (Millen & Gable, 2015). In the conceptual model of differentiated instruction, Tomlinson (2017) encouraged teachers to "understand how individuals learn, and then respond with a range of choices suited to the learners and the work they are doing" (p. 122). Educators in the

21st century aspire to provide equitable opportunities for all students while recognizing different attitudes, personalities, interests, and learning style preferences (Freedman, 2015).

The background of the study and an introduction to the conceptual framework were included in Chapter One. The statement of the problem, the purpose of the study, and the research questions were provided. The significance of the study and the definition of key terms were also included in Chapter One. Finally, the delimitations, limitations, and assumptions were stated.

An in-depth literature review of learner diversity associated with differentiated instruction is presented in Chapter Two. The Big Five personality traits, the importance of learning style preferences, and self-efficacy domains are described in detail. The current state of differentiated instruction, obstacles for teachers, and whole-school implementation are also described.

Chapter Two: Review of Literature

Classrooms are more diverse than ever, demands on teachers have soared, and a one-size-fits-all curriculum is not ideal for every student (Aftab, 2015; Birnie, 2015; Marghitan et al., 2016). According to Aftab (2015), "Due to the increase of mixed ability classrooms, it is essential to maintain equity" (p. 99). Goddard and Goddard (2015) asserted teachers are required to provide adequate and appropriate instruction to a wide variety of learner profiles. The use of diagnostic tools and assessments can guide the implementation of differentiated instruction (Freedman, 2015).

Research studies were selected and included in this review to discuss, analyze, and evaluate differentiated instruction regarding learner diversity. The investigation included an examination of diagnostic tools that can be used to create learner profiles based on differences in personality type, self-efficacy, and learning style preference. Definitions, explanations, and criticisms of differentiated instruction were provided in the selected sources.

The literature review begins with a description of the conceptual framework. Next, a brief synopsis of the freshman year of high school is presented to highlight this critical transition. Following, an overview of differentiated instruction is included to reveal how increased awareness of learner diversity can be used to individualize instruction in schools today (Birnie, 2015). Topics related to differentiated instruction include neuroscience research, critiques, student perceptions, implementation today including barriers and strategies, and school norms and culture. A summary of the Big Five personality types is provided along with an explanation of how the Big Five personality types relate to differentiated instruction (Qaisy & Thawabieh, 2016).

Differences in personality type and self-efficacy, along with differences in personality type and learning style preferences, are incorporated in the review. A description of learning style preferences with an explanation of how learning styles relate to differentiated instruction is also included (Sreenidhi & Helena, 2017). Information on learning style inventories including Gardner's Theory of Multiple Intelligences and Fleming's VARK model are introduced. In addition, differences in learning style preferences and self-efficacy are mentioned. Finally, a summary of Bandura's (1994) social cognitive theory is provided. Topics related to self-efficacy discussed include self-efficacy in academic settings and the three domains of self-efficacy: academic, social, and emotional (Muris, 2001).

Conceptual Framework

The framework that guided this study was the conceptual model of differentiated instruction (Subban & Round, 2015). Differentiated instruction was selected because constructivist theories have long shaped differentiated instruction, a pedagogical practice to meet the needs of each learner in a diversified environment (Millen & Gable, 2015). Differentiated instruction has a promising future, as it involves providing equal opportunities for all students to reach their full potential (Freedman, 2015). According to Boelens, Voet, and De Wever (2018), differentiated instruction can be employed at the institutional level with grouping or at the classroom level with varied content delivery. Tomlinson (2017) asserted educators can bridge the gap between learner diversity and curricular realities through differentiation.

Of importance, Vygotsky's (1978) theory of cognitive development was based on the assertion that contemporary education involves student-teacher engagement,

scaffolding, and attention to individual student ability. In addition, Vygotsky (1978) explored how students construct meaning and suggested teachers and peer role models guide each student based on social and cultural experiences, as well as student interests. Recently, Tomlinson (2017) maintained that in a differentiated classroom, the class can be treated as a community, but each student requires a variety of supportive teaching and learning opportunities.

Personality traits contribute to individual behavior, responses to stimuli, and achievement (Qaisy & Thawabieh, 2016). According to Khatibi and Khormaei (2016), "The word personality originated from the Latin 'persona,' which means mask" (p. 89). Personality can be defined as the dynamic uniqueness of an individual; knowing one's personality can aid in understanding present and future behaviors (Qaisy & Thawabieh, 2016). According to Dutt and Kumari (2016), personality traits are fundamental to determining life satisfaction and well-being.

Costa and McCrae, developers of the Big Five Survey, categorized personality types into five categories: neuroticism, extraversion, openness, agreeableness, and conscientiousness (Favaretto, Dihl, Musse, Vilanova, & Costa, 2017). As reported by Sorrenti, Filippello, Buzzai, Buttò, and Costa (2017), academic performance is significantly correlated to agreeableness, conscientiousness, and openness to experience. Researchers have supported a clear understanding of the relationship between personality traits and learning style preferences to enhance differentiated instruction (Djigić et al., 2016).

Regarding the theory of multiple intelligences, Gardner identified nine human intelligence domains: "verbal/linguistic, logical/mathematical, visual/spatial,

bodily/kinesthetic, musical/rhythmic, interpersonal, intrapersonal, naturalistic, and existential" (Omer, 2017, p. 591). Specifically, Gardner stated, "The goal of detecting distinctive human strengths, and using them as a basis for engagement and learning may prove to be worthwhile" (Gardner & Hatch, 1989, p. 9). Of note, Sreenidhi and Helena (2017) claimed proponents of differentiated instruction support the meshing hypothesis, which occurs when lessons are taught in a method that matches a student's dominant learning style. According to Leasa, Corebima, Ibrohim, and Suwono (2017), learning styles can change over time based on individual development and learning environment. In addition, learning style tendencies may be generational (Chen, Jones, & Xu, 2018).

Differentiated instruction can be enhanced with correlational evidence between self-efficacy and academic performance (Honicke & Broadbent, 2016). In educational settings, self-efficacy is positively related to academic performance (Honicke & Broadbent, 2016; Köseoğlu, 2015; Schunk & DiBenedetto, 2016) and self-regulated learning (Panadero, Jonsson, & Botella, 2017). Self-efficacy is part of the social cognitive theory postulated by Bandura, who described the trio of personal, behavioral, and environmental influences involved with human functioning (Schunk & DiBenedetto, 2016).

Of importance, Bandura (1994) defined "perceived self-efficacy as people's beliefs about their capabilities to produce designated levels of performance that exercise influence over events that affect their lives" (p. 2). According to Fallan and Opstad (2016), a student's level of self-efficacy can depend on effort, difficulty, teacher support, and learning modality. Additionally, in a school context, teachers can promote self-efficacy by offering supportive messages, creating positive experiences, and reducing

negative emotions (Doménech-Betoret, Abellán-Roselló, & Gómez-Artiga, 2017). Thus, Fallen and Opstad (2016) dictated it is of utmost importance that teachers encourage and develop student self-confidence.

Ninth-Grade Students: A Transitional Year

Ninth-grade students typically go through physical, emotional, relational, and spiritual changes; they seek approval and meaningful adult relationships, strongly valuing what others think (Kovacs, 2018). Ninth-grade grade-point average (GPA) is a strong predictor of high school academic success, graduation rate, and enrollment in college; many freshmen remain on the trajectory established during this determinative year (Easton, Johnson, & Sartain, 2017). According to DeLamar and Brown (2016), ninth-grade students experience an often difficult and awkward transition as they adjust to high school. Additionally, the high school atmosphere can feel impersonal and competitive, with unrealistic expectations and less emphasis on social and emotional support (Kovacs, 2018).

A meaningful transition is a critical time to increase student motivation and autonomy for success throughout high school (DeLamar & Brown, 2016). Suggestions for helping with the transition into high school include for administrators, teachers, and parents to make sure the individual needs of students are met (DeLamar & Brown, 2016) and for teachers to build student self-efficacy (Kovacs, 2018). Moreover, Nenthien and Loima (2016) found that when teachers design learning activities to increase interest while using encouragement, student motivation increases. Student motivation also increases when students are presented with opportunities for independent thinking (Kovacs, 2018).

Differentiated Instruction

Five themes have emerged as integral aspects of pedagogy that enable teachers to differentiate instruction:

1. the structure, organization, and development of a lesson

2. classroom management

3. strategies and techniques

4. activities, materials, and teaching aids

5. assessments and application. (Subban & Round, 2015)

The structure, organization, and development of a lesson begins with content; content refers to the knowledge and skills students must learn (Gaitas & Martins, 2016). When teachers differentiate content, they create different pathways for how students can access and retain information (Kaur, 2017).

Additionally, van Geel et al. (2019) suggested the level of content knowledge held by the instructor is important in all aspects of differentiating content to students as well as making decisions about curriculum. Strategies suggested to promote content differentiation include providing resources with varied reading levels, small group instruction, catering to learning style preferences, tiered assignments, and monopolizing on relevancy (Santangelo & Tomlinson, 2009). Jigsaw is a popular method to differentiate content in group learning; each group member is responsible for a different piece of the topic, like a puzzle (Hollas, 2007).

Teachers who use differentiated instruction offer a non-threatening environment and tend to have better classroom management skills, allowing more opportunities for student engagement (Gaitas & Martins, 2016). In addition, van Geel et al. (2019)

suggested a safe climate and orderly atmosphere are essential for differentiated instruction to be successful. Other methods for providing an effective learning space include priority seating, positive discipline, and flexible furniture arrangement (Shparyk, 2017).

Subban and Round (2015) reported active students are typically more productive, and students may become disengaged when a one-size-fits-all curriculum is implemented. Furthermore, Guay et al. (2017) found students become bored when lessons are too easy, and some students develop anxiety when lessons are too advanced. Teachers of learner-centered classrooms facilitate learning, encourage different perspectives, and support relationships with their students (Moate & Cox, 2015).

Strategies and techniques that support differentiated instruction revolve around what Tomlinson (2017) referred to as process. Process, as well as content, can be varied based on students' readiness, interests, and learning profiles (Tomlinson, 2017). Process can be defined by the approach to an activity used to help the student make sense of and master the content (Kaur, 2017). Possible strategies used to vary process, according to Santangelo and Tomlinson (2009), include offering choices, catering to all learning styles, providing directions and activities at all levels of mastery, flexible grouping, and ongoing assessments. Additionally, Hollas (2007) suggested strategies to differentiate questioning, learning logs, and wait time.

Activities, materials, and teaching aids used in differentiated classrooms vary to a large degree based on learner profiles and use of technology (Subban & Round, 2015). In addition, Subban and Round (2015) reported when teachers offer a large repertoire of activities, they also promote student choice, possibly increasing student autonomy,

responsibility, and accountability. Furthermore, Tomlinson (2017) asserted variation in activities can be accomplished by catering to students based on interests, learning profiles, and readiness.

According to Santangelo and Tomlinson (2009), differentiating activities and materials according to student interests can help them make connections with prior knowledge and experiences, along with increasing motivation. In addition, Santangelo and Tomlinson (2009) described a student's learning profile as representative of how he or she learns most effectively, making use of characteristics such as cognitive style and learning style preferences. Student readiness can be defined as the level of knowledge, skill, and efficacy for learning to meet the demands of tasks or curricular objectives (Gaitas & Martins, 2016). To consider readiness when differentiating instruction, Tomlinson (2017) encouraged the use of graphic organizers, literature circles, tiered assignments, and lessons designed for different intelligences.

Meaningful assessment and application are essential to differentiated instruction, notably with the use of formative or ongoing assessment to gauge the progress of each learner (Subban & Round, 2015). Interim assessments, exit tickets, and quizzes are effective because the data can be used to help students struggling with specific concepts before a summative assessment (Marshall, 2016). In addition, Subban and Round (2015) suggested when it comes to assessment, teachers should offer student choice, design questions that assess the application of knowledge, and focus on measuring growth. In differentiated instruction, Tomlinson (2017) used the term *product* to describe how students show what they know, understand, and can do. Products should offer multiple

pathways for students to show mastery as well as opportunities for peer and self-

evaluation (Santangelo & Tomlinson, 2009).

    Neuroscience supporting differentiated instruction. Educational neuroscience,

a new discipline that combines cognitive psychology, neuroscience, and pedagogy, can

give educators insight into how to differentiate instruction (Sousa & Tomlinson, 2018).

According to Howard-Jones et al. (2016), brain imaging technology can be used to

improve pedagogy and evaluate educational achievement from a more scientific

understanding of the processes involved. Moreover, new information and tools from

brain research can enable teachers to choose more appropriate methods of instruction

based on learner profiles (Brookman-Byrne & Thomas, 2018).

    Teachers can boost student motivation when they provide opportunities for

autonomy and choice (Ng, 2018). Brain scans have shown that when new information is

relevant to the learner, cerebral activity increases, followed by a dramatic increase in

retention (Sousa & Tomlinson, 2018). Through differentiated instruction, the brain can

detect patterns, retain information, and increase divergent thinking (Sousa & Tomlinson,

2018). Moreover, when educators adjust pedagogy to learner readiness, the brain can

release endorphins and dopamine, which can keep students motivated to seek and apply

new information (Brookman-Byrne & Thomas, 2018; Sousa & Tomlinson, 2018).

    Researchers have provided evidence that stimulating learning environments can

increase neuron development, which could raise IQ levels; a negative or irrelevant

learning environment can create stress, causing the brain to release cortisol, a powerful

steroid that can raise anxiety (Sousa & Tomlinson, 2018). Additionally, the working

memory of students in a fast-paced, one-size-fits-all classroom is not as functional as in a

differentiated, more personalized environment (Sousa & Tomlinson, 2018). According to Gabrieli (2016), educational neuroscience can address student needs beyond the curriculum, notably for vulnerable students.

Although neuroscientific findings may be valuable for describing the process of learning, Ferrero, Garaizar, and Vadillo (2016) claimed the data cannot yet inform pedagogy directly. In addition, Ferraro et al. (2016) stated neuroscience has no place in education as there is insufficient knowledge, poor communication between educators and scientists, and too many differences in terminology. Moreover, Bowers (2016) stated, "It is easier to characterize the cognitive capacities of children on the basis of behavioral measures than on the basis of brain measures" (p. 1), and he predicted neuroscience is unlikely to improve teaching in the future. According to Thomas, Ansari, and Knowland (2019), educational neuroscience is battling criticism with ethical issues, proposed use of data to predict developmental outcomes, and relevancy to education as a whole.

Critiques of differentiated instruction. Critics argue a differentiated classroom will be ineffective as some students might be unproductive, confused, and even lose interest (Aftab, 2015). Some teachers have stated that not all content-based curricular standards can be differentiated, misbehavior could increase without teacher-centered instruction, and teachers might feel uncomfortable giving up control (Dugas, 2017). Moreover, Bannister (2016) declared differentiated instruction might enhance stereotypical deficits, only perpetuating inequity. Specifically, Bannister (2016) outlined four major criticisms of differentiated instruction:

(a) assumptions that students labeled with "less developed readiness" need more direct instruction and routine practice over inquiry-based pedagogical approaches,

(b) perpetuation of the myth of learning styles in education, (c) whether the

differentiated instruction model has the unlikely capacity to preclude within-

classroom tracking practices, and (d) usage of deficit framings of students and

their families within an academic diversity rationale for the model. (p. 341)

Student perceptions of differentiated instruction. There is evidence that

students prefer diverse avenues of learning to meet their needs (Ismajli & Imami-Morina,

2018). According to Marghitan et al. (2016), students favored the use of differentiated

instruction due to active involvement in the learning process, an increase in motivation,

and a better understanding of higher-level cognitive skills. In a study of one-to-one

pedagogy, similar to differentiated instruction, students viewed the process as invaluable

and effective (Carey & Grant, 2015). Moreover, when teachers used didactic strategies,

students were stimulated by interest in knowledge, discovery, and reflection (Marghitan

et al., 2016). On the contrary, students have commented on challenges with

differentiation associated with balancing student-teacher relationships and expectations

(Carey & Grant, 2015).

Differentiated instruction today. Differentiated instruction requires teachers to

assess and respond to student needs and interests by creating lessons that provide a

variety of opportunities to demonstrate learning (Goddard & Goddard, 2015; Subban &

Round, 2015). In addition, Freedman (2015) recommended teachers get to know their

class as a whole and effectively use diagnostic tools to understand individual students'

needs, abilities, interests, and strengths. Knowledge of culture, socioeconomic status,

and readiness can be helpful for educators when planning instructional delivery methods

to increase student engagement and promote student development (Gaitas & Martins, 2016).

Today, teacher preparation programs are responsible for stressing the importance of identifying and catering to learner differences (Subban & Round, 2015). Education professors and university supervisors can support differentiated instruction by giving aspiring teachers opportunities to work with diverse learners and experience the development of multi-tasking classrooms (Gaitas & Martins, 2016). Preservice teachers benefit from developing the awareness, knowledge, and skills that will be used with diverse students (Brevik, Gunnulfsen, & Renzulli, 2018). Moreover, Andronic and Andronic (2016) recommended a national generalization course for preservice teachers geared to teach lesson design based on multiple intelligences. Preservice teachers have mentioned the process of identifying student differences and needs is not problematic, but differentiating instruction is difficult (Brevik et al., 2018).

Barriers to implementation. Reasons differentiated instruction may not be implemented adequately include teacher unpreparedness, lack of adequate conditions, and crowded classrooms, especially in public schools (Ismajli & Imami-Morina, 2018). Many teachers feel initiating the practice of differentiated instruction is challenging because of increased planning time, commitment to ongoing professional development, and unfamiliar adjustments to classroom management and assessments (Gaitas & Martins, 2016; Guay et al., 2017). Implementing differentiated instruction practices can cause uncertainty for teachers who feel comfortable with their current practices (Dijkstra, Walraven, Mooij, & Kirschner, 2017). Furthermore, Suprayogi, Valcke, and Godwin

(2017) communicated that self-efficacy, teaching beliefs, and background characteristics also impact the desire to differentiate.

To dispute the popular claim that differentiating instruction is difficult with large numbers of students in one classroom, Bernard et al. (2017) stated advances in online education and technology can aid in reaching the needs of each learner. Utilizing technology can lift the burden of cumbersome lesson plans and make learning more engaging and enjoyable, especially for high achievers (Brevik et al., 2018). Moreover, Lue (2017) stated, "Educators who fail to go above and beyond to effectively differentiate their instruction, subject their students to a one-size-fits-all method of instruction; there seems to be no way around the time and effort needed to facilitate effective differentiated instruction" (p. 46). Further, Birnie (2015) explained differentiation does not mean creating a separate lesson plan for each student; proper training can ease the uncertainties educators share. According to Tomlinson (2017), easy-to-implement strategies include choice boards, discussion circles, and stations. Additionally, Ismajli and Imami-Morina (2018) suggested instructors should seek knowledge about students by conversing with parents, as well as participating in training that links effective pedagogical strategies with diverse learning needs.

Strategies for implementation. Congruent to many other ventures in education, Birnie (2015) encouraged teachers to start small with an aspect of differentiation that is appealing to them, such as interest surveys or observation of learning style preferences. Worth mentioning, Gaitas and Martins (2016) advised having a curricular support team meet on a regular basis, discuss strategies to better support student learning, visit common difficulties, and address common goals. Other strategies teachers can use to

ease the workload of differentiating lessons include having students help keep track of their progress and meeting with students individually or in small groups to check understanding and provide feedback (Aftab, 2015). One goal of teacher education programs is to focus on creating a safe learning environment as a baseline, then differentiating while balancing academic and social expectations (Brevik et al., 2018). Furthermore, to prevent burnout, Marshall (2016) promoted ideas such as taking time to explore pre-existing templates, looking for resources readily available and printable, and cataloging strategies that work well and do not work well.

According to McKnight (2017), "A variety of management strategies such as learning centers, interest centers, compacting, contracts, independent study, collegial partnerships, tiered assignments, and learning buddies" can be used to implement differentiated instruction (p. 4). Sousa and Tomlinson (2018) listed five classroom elements teachers can modify in response to student needs:

a) content, what students must learn

b) process, how students will learn

c) product, how students demonstrate what they have learned

d) affect, attention to students' needs and feelings

e) environment, physical and affective. (p. 13)

Further, McKnight (2017) stated what differentiation is not:

a) an educational fad

b) busy work for advanced learners

c) fluff n' stuff within preferred ways of doing

d) individualization

e) the magic panacea

f) a new version of tracking

g) done all the time

h) constant group work

i) louder and slower in the back of the room

j) "on the fly." (p. 5)

After studying schools in which the entire faculty provided differentiated instruction in mixed-ability classrooms, Tomlinson (2015) pointed out teachers plan for advanced learners first, then scaffold lessons as needed for less-advanced students.

School norms and culture. Common factors that help teachers employ differentiated instructional strategies include internal staff training, collaboration, and resources (Freedman, 2015). Moreover, Aftab (2015) suggested the implementation of differentiated instruction should be a joint effort among teachers, administrators, and stakeholders. Professional development and district-level support raise teacher efficacy levels and lead to increased understanding and execution (Subban, 2006). In accordance, Goddard and Goddard (2015) stated, "The stronger the group norms for differentiated instruction in a school, the more likely the informal social system is to operate in ways that encourage teachers to differentiate their teaching" (p. 9). Whole-school change requires a coordinated, sustained effort from all stakeholders (Subban, 2006). In fact, Tomlinson (2015) reported achievement across all levels of learners will increase when differentiated techniques are implemented by all teachers in a district.

Personality Types

The study of personality traits harkens back to the work of Hippocrates (Harlow et al., 2017; Khatibi & Khormaei, 2016). Educators have always been curious about whether personality traits play a role in academic achievement (Hakimi, Hejazi, & Lavasani, 2011). According to Hakimi et al. (2011), "Students have distinctive personality characteristics which makes them prepared for having different worldviews, and thus behaving differently in various academic and educational settings; when achievement criteria and personality characteristics overlap, personality and academic achievement may be directly related" (p. 837). Recent studies indicate personality, as opposed to intelligence, may have a distinct impact on achievement in educational settings (Vedel & Poropat, 2017).

Digital assessments can be useful in predicting personality traits (Favaretto et al., 2017). Understanding the personality traits of students may be necessary for developing meaningful, individualized curriculum for all students (Djigić et al., 2016). In addition, "teachers and instructors may be better equipped to structure the learning environment in a way that engages the students, makes them feel comfortable, and facilitates the learning process" (Vedel, 2015, p. 8). Not only have researchers suggested personality traits play a role in academic performance (Vasileva-Stojanovska et al., 2015), certain personality traits have been linked to gratification (Dutt & Kumari, 2016).

Differentiating according to personality types. A common challenge facing educators is responding to increasing diversity and capabilities of students; teachers are asked to provide instruction to very dynamic academic profiles (Goddard & Goddard, 2015). Although students enter classrooms with diverse personalities, predispositions,

and learning styles, educators can meet the needs of all students using differentiated instruction (Subban, 2006). In the conceptual model of differentiated instruction, a flexible approach to pedagogy, as well as access to high-quality education, rests on tending to student differences (Valiandes, 2015). Student motivation for autonomous learning is enhanced when teachers offer activities that are interesting and enjoyable (Sulea, Beek, Sarbescu, Virga, & Schaufeli, 2015).

The Big Five. Goldberg (1992) proposed a personality model nicknamed the Big Five, which has led to consistent results in relation to academic achievement. The Big Five model consists of five major personality traits accompanied by sub-traits that make each personality unique: "conscientiousness, openness to experience, agreeableness, extraversion, and neuroticism" (Qaisy & Thawabieh, 2016, p. 13). Researchers have shown the Big Five personality traits are relatively stable over time (Berlin, Tavani, & Beasancon, 2016) and can predict students' educational identities (Khatibi & Khormaei, 2016).

Openness to experience. According to Qaisy and Thawabieh (2016), "The people who are characterized with openness to experience are mentally mature, curious, ambitious, competitive, enthusiastic, sensitive and respectful to values" (p. 12). Openness to experience has been linked to elaborative processing and synthesis-analysis, skills that often lead to academic success (Khatibi & Khormaei, 2016). Openness nurtures students' attitudes toward education, which may lead to increased motivation and academic success (Caprara, Vecchione, Alessandri, Gerbino, & Barbaranelli, 2011). Berlin et al. (2016) concluded openness reflects natural curiosity and is associated with creativity and intellectual ability.

Conscientiousness. Conscientiousness is the dominant personality trait in relation to predicting academic achievement (Köseoğlu, 2016; Qaisy & Thawabieh, 2016; Vedel, 2015). Conscientious individuals are more likely to be engaged, disciplined, organized, and achievement-oriented (Berlin et al., 2016; Sulea et al., 2015). Other facets of conscientiousness include perseverance, reliability, being methodical, being dutiful, and proficiency (Caprara et al., 2011). Conscientiousness is shown to correlate with high self-efficacy and could enhance the quality of life of students (Sorrenti et al., 2017).

Extraversion. According to Qaisy and Thawabieh (2016), "Extraversion people are characterized by the following traits: warmth, activity, sociality, assertiveness, search for stimulation, and availability of emotions" (p. 12). One definition of extraversion, according to Favaretto et al. (2017), is "quantity and intensity of energy directed outwards in the social world" (p. 223). Extraversion is one of the Big Five factors that leads to inconsistent results with regard to academic achievement (Caprara et al., 2011). Extraversion correlates with higher academic achievement among younger students and lower academic achievement with older students (Hakimi et al., 2011). According to Dutt and Kumari (2016), the warm and outgoing personality traits of extraverted individuals contribute to a significant relationship with life satisfaction.

Agreeableness. According to Dutt and Kumari (2016), agreeableness is associated with positive social experiences and life satisfaction. Qaisy and Thawabieh (2016) stated, "Agreeableness is a personality trait that focuses on intrapersonal and interpersonal relations… characterized by confidence, altruism, empathy, and humanity" (p. 12). Berlin et al. (2016) defined an agreeable person as "someone who is helpful, sympathetic and cooperative" (p. 539). Although researchers have suggested

agreeableness correlates with academic success (Hakimi et al., 2011), findings are less consistent than with conscientiousness (Caprara et al., 2011). Agreeableness, however, can be associated with compliance, following instructions, and good classroom behavior (Kim, Fernandez, & Terrier, 2017). Studies have shown agreeableness has a strong correlation with the kinesthetic learning style, possibly because of the trusting and cooperative characteristics people with this personality possess (Afzaal, Siau, & Suhali, 2019).

      Neuroticism. According to Qaisy and Thawabieh (2016), "Neuroticism is a personality disorder that affects a person's life and his/her sense of happiness… these individuals are characterized by anxiety, aggression, depression, and impulsivity" (p. 12). The emotional instability associated with neuroticism may correlate with poor academic achievement (Honicke & Broadbent, 2016; Nyarko, Kugbey, Amissah, Ansah-Nyarko, & Dedzo, 2016). Additionally, the negative correlation of academic performance with neuroticism could be a result of excessive absences from school related to illness and medical conditions (Hakimi et al., 2011). Neuroticism is the only Big Five factor with a negative correlation to all four learning styles (Afzaal et al., 2019; Khatibi & Khormaei, 2016) and a positive relationship with burnout (Sulea et al., 2015). According to Junaid (2017), neurotic individuals lack the ability to see how things relate to one another, are extrinsically motivated, and exhibit surface learning.

      Personality type and self-efficacy. Personality traits have been shown to guide aspects of human behavior tied to self-efficacy (Qaisy & Thawabieh, 2016). Zhang (2016) suggested students' perceived ability to accept and pursue the demands of life could be linked to their personality traits. According to Zhang (2016), "Generalized self-

efficacy mediated the relationship of extraversion, openness, conscientiousness, and neuroticism to life satisfaction, and the relationship of openness and conscientiousness to subjective happiness" (p. 2010). Specifically, Dutt and Kamari (2016) mentioned the trait of agreeableness could be linked to social self-efficacy.

Both personality traits and self-efficacy have been shown to enhance scholastic performance, namely openness and conscientiousness (Caprara et al., 2011). Stajkovic, Bandura, Locke, Lee, and Sergent (2018) suggested students could be more successful if they learn to advocate for their personality traits and self-efficacy; students who portray self-doubt about learning may avoid activities despite their personality type. Sorrenti et al. (2017) described personality traits as stable across time, whereas self-efficacy beliefs are subject to change with personality-related experiences.

Personality type and learning style preferences. Student responses to content delivery vary depending on personality type (Emerson, English, & McGoldrick, 2016). Several studies have cited a relationship between personality traits and learning style preferences; learners tend to improve academically when they use their personality type to identify with a specific learning strategy (Khatibi & Khormaei, 2016). Puji and Ahmad (2016) claimed the Big Five personality types influence learning styles, namely extroverted people who prefer active learning and exhibit notable social skills.

According to Emerson et al. (2016), there are significant differences among personality types and learning strategies, namely cooperative learning activities. Hence, not only can teachers implement cooperative learning activities for complimentary personality types, teachers can increase the engagement of students who otherwise feel isolated (Emerson et al., 2016). In addition, Marcela (2015) found a significant

relationship between personality types and learning style preferences among university students.

Specifically, Marcela (2015) reported individuals who display openness or conscientiousness prefer deep processing and elaborative processing. Researchers have revealed a strong correlation between cognitive styles, such as field-dependent and field-independent, and personality types (Phongploenpis & Samart, 2018). Contrary to evidence claiming learning style preferences can be predicted based on personality traits and the correlation can optimize support for learners (Djigić et al., 2016), Murphy et al. (2017) found few differences between personality type and learner preferences except for activities involving peer discussion where extroverts dominated.

Learning Styles

The idea of mapping learning styles has been around for decades and is thought to be "the most scientific way we know to individualize instruction" (Dunn et al., 2008, p. 139). According to Kharb et al. (2013), "The term 'learning style' describes an individual's preferred method of gathering, processing, interpreting, organizing and analyzing information" (p. 2). As reported by Sreenidhi and Helena (2017), people prefer one learning style over another, often maximizing their learning with a blend of two or three learning styles. Moreover, Leasa et al. (2017) concluded learning styles can change over time, usually from a kinesthetic domain in elementary school to a visual learning preference in high school, then to a multimodal style in college.

Student awareness of learning style preferences shifts pedagogy from a teacher-centered lecture method to a student-centered interactive approach (Prithishkumar & Michael, 2014). Additionally, students can maximize their capability to become lifelong

learners if they are aware of their preferred learning style(s) (Kharb et al., 2013).

Awareness of one's learning style can positively influence academic achievement

(Moayyeri, 2015). On the other hand, Willingham, Hughes, and Dobolyi (2015) declared

learning style theories lack substantial evidence while providing assumptions a person's

learning style remains the same in any situation and on any task.

      Differentiating instruction according to learning style preferences. The

conceptual model of differentiated instruction entails educators support diverse learning

styles, interests, socioeconomic status, personality, and social skills (Valiandes, 2015). If

educators are aware of students' learning styles, instruction can be tailored to meet

individual learner needs (Djigić et al., 2016). In fact, Prithishkumar and Michael (2014)

claimed, "There is no single best way to teach, but teachers can diversify their teaching

styles to cater to the learning styles of each distinctive student" (p. 5). Research

suggested the most effective way to deliver instruction is to cater to all learning style

preferences as often as possible (Ibrahim & Hussein, 2016; Jayakumar, Suresh,

Sundaramari, & Prathap, 2017), as there is no dominant learning style (Hamdani, 2015).

By using a plethora of teaching approaches, the probability of all students learning

increases; student awareness, however, may help contribute to academic success (Awang,

Samad, Faiz, Roddin, & Kankia, 2017). In addition, teachers' use of multimedia can lead

to increased representation of all learning styles in classrooms (Kharb et al., 2013).

      Adjusting the delivery of content to match individual learning preferences of

students can boost academic success and enrich the quality of life (Hamdani, 2015).

According to Pritchard (2017), teachers need to be fully aware of learning styles, offering

choice of activity and response as needed; however, at the same time, teachers need to

prepare students for expectations and exams later in life. Dunn et al. (2008) noted several ways learning style impacts students beyond the classroom: learning style awareness increases respect for diversity, teachers reflect on their learning styles, autonomous learning is encouraged, students accept responsibility for their learning, instruction is personalized, social justice and equity are recognized, and knowledge of brain processing reduces bias.

Learning style inventories. Teachers use learning style inventories to guide pedagogical practices (Baig & Ahmad, 2016). To gain information on the learning style of an individual, a learning style survey is often used (Rutledge, 2016). Self-report questionnaires are common modes for creating learner profiles among researchers and practitioners (Duckworth & Yeager, 2015). Freedman (2015) suggested students gain, comprehend, and retain information more effectively when teaching strategies match students' preferred learning styles.

However, Kirschner (2017) argued the style in which an individual prefers to learn and the style in which he or she learns best are often mismatched. Moreover, students might be dishonest when scores are anonymous and the questionnaire is lengthy (Duckworth & Yeager, 2015). According to Rogowsky, Calhoun, and Tallal (2015), teachers could be doing a disservice to learners by accommodating their learning styles too much instead of strengthening skills students may be lacking. Additionally, Pritchard (2017) offered that if students know their dominant learning style, they might focus on that one modality and even refuse to work in other modes.

Gardner's theory of multiple intelligences. Gardner's theory of multiple intelligences outlines distinct approaches individuals take to understand the world based

on personalities and strengths (Andronic & Andronic, 2016). The nine intelligences include "verbal-linguistic, logical-mathematical, spatial-visual, bodily-kinesthetic, musical, interpersonal, intrapersonal, naturalist, and existential" (Omer, 2017, p. 591). It is important to note intelligence domains are not static, and the domains are interconnected (Ahvan & Pour, 2016). One strategy of incorporating the multiple intelligences of students is for teachers to deliver lessons using traditional methods, then provide follow-up activities targeting each of the domains (Pritchard, 2017).

Increasing awareness of adolescent intelligence modalities aids in developing intelligence profiles educators can use to individualize instruction (Ahvan & Pour, 2016). Several researchers have indicated increased levels of student understanding and achievement when instruction is tailored to intelligence profiles (Subban & Round, 2015). Moreover, Pritchard (2017) cited evidence that when teachers use multiple intelligences to guide pedagogy, there is an increase in student responsibility, self-directed learning, and cooperative learning skills and a reduction in classroom discipline problems. Teachers also revealed that when they are aware of the multiple intelligences of their students, they appreciate the diversity of their students, promote a more positive classroom climate, plan better lessons, and spend more time reflecting on their practice as well as their intelligence domain (Pritchard, 2017).

Fleming's VARK model. The VARK learning style model, which classifies students into four different learning modes, was introduced by Fleming in 2006 (Prithishkumar & Michael, 2014). Specifically, Sreenidhi and Helena (2017) outlined three of the four modalities of the VARK model: visual learners make up two-thirds of the general population and learn through pictures, mapping, watching others, and

visualizing what they hear; auditory learners make up one-third of the general population and pay attention to words, take detailed notes, and enjoy discussions and seminars; and kinesthetic learners make up a small percentage of the general population and learn through discovery, prefer hands-on experiences, use models, and enjoy being in locations such as gymnasiums and laboratories (pp. 18-21).

The fourth domain of the VARK model is 'read'; students who prefer the read modality like reading and have a knack for writing but do not speak out like individuals who display extroversion (Leasa et al., 2017). Individuals who prefer the 'read' domain elect to make lists, draft essays, and take notes (Moayyeri, 2015). Whether students are unimodal or multimodal regarding the VARK learning styles, a mutualism of teaching and learning styles can enhance instruction (Mugot, 2019). Multiple benefits of the VARK assessment have been outlined:

- Provides a head start and maximizes learning potential.
- Understand preferred mode of learning.
- Discovers the sort of instruction and teaching style an individual is most likely to benefit from.
- Allows individuals to learn through their own best strategies.
- Provides customized techniques for students to score better on tests and exams; shows how to overcome the limitations of poor instructors.
- Reduces the stress and frustration of learning experiences.
- Expands existing learning and studying strategies.
- Illustrates how to take advantage of natural skills & inclinations.
- Demonstrates how to manage teams more effectively.

- Helps create competent teams with balanced talent mix for efficient completion of specific assignments.

- Gives guidelines about delivering effective presentations to diverse audiences.

- Conflict resolution between people – Helps understand the differences in their styles, values, ways of communicating and expressing their feelings.

- IDP / Career and Vocational Guidance – Identifies an individual's preferences in order to determine the factors that are responsible for his/her satisfaction. (Sreenidhi & Helena, 2017, p. 24)

Learning styles and self-efficacy. Teaching students to use their learning styles can be beneficial in increasing self-efficacy (Schunk & DiBenedetto, 2016). According to Littlejohn, Hood, Milligan, and Mustain (2016), "A learner's self-efficacy shapes their motivation and the particular learning style they employ in relation to a specific learning context or activity" (p. 6). In addition, Høigaard, Kovač, Øverby, and Haugen (2015) found academic self-efficacy can be improved through task-oriented activities, positive feedback, and interaction among peers. However, Littlejohn et al. (2016) stated learners may identify with the familiarity of content more so than with academic self-efficacy.

Self-Efficacy: Bandura's Social Cognitive Theory

According to Bandura's (1994) social cognitive theory, human behavior is a function of inner processes wherein vicarious experiences influence beliefs and ultimately influence behavior. Individuals can strengthen self-efficacy beliefs through mastery experiences that require sustained effort, observation of others with high self-efficacy, and social verbal persuasion (Bandura, 1994). People who do not believe in

their abilities can experience anxiety, miss out on challenging opportunities, and feel inadequate (Gharetepeh, Safari, Pashaei, Razaei, & Kajbaf, 2015).

     Self-Efficacy in academic settings. The social cognitive theory is commonly applied to education because teachers have the power to influence student behavior through a variety of experiences in the classroom where students face successes and failures (Subban & Round, 2015). Additionally, Caprara et al. (2011) suggested teachers and administrators should accept the challenge of increasing students' self-efficacy as early as possible. According to Brown, Peterson, and Yao (2016), it is plausible students with academic self-efficacy can identify their own learning needs, subsequently leading to a distinguished level of academic achievement. Educators who do not differentiate instruction can frustrate students, lowering academic self-efficacy and putting them further behind (Schunk & DiBenedetto, 2016).

     Specifically, teachers can strengthen the self-efficacy of students by offering emotional support (Martin & Rimm-Kaufman, 2015), setting attainable goals, giving specific feedback, and having students self-monitor their progress (Schunk & DiBenedetto, 2016). In addition, Burton and Campbell (2019) found students' self-efficacy and engagement increases with positive student-teacher and peer relationships, positive emotional experiences in the classroom, high achievement goals, and opportunities to experience success. Moreover, Määttä, Järvelä, and Perry (2016) suggested students gain confidence if teachers ask them to identify their emotional states during class time, as well as help students reflect on ideas that contribute to successes and failures.

Teachers who offer clear expectations, provide a non-chaotic environment, and respond to students' interests and needs can increase engagement and academic performance (Martin & Rimm-Kaufman, 2015). With regard to differentiation, students are likely to choose and engage in activities in which they feel they can experience success and avoid tasks in which they feel less efficacious (Schunk & DiBenedetto, 2016). Students with a low perceived self-efficacy participate less often in activities that involve interaction with peers (Määttä et al., 2016).

Academic self-efficacy. Adolescent academic self-efficacy is elemental to academic achievement and life satisfaction (Ansong, Eisensmith, Masa, & Chowa, 2016). Bandura (1994) stated, "Students' belief in their capabilities to master academic activities affects their aspirations, their level of interest in academic activities, and their academic accomplishments" (p. 11). Research suggests a strong correlation between high academic self-efficacy and academic achievement (Honicke & Broadbent, 2016; Köseoğlu, 2015; Minter & Pritzker, 2015).

Academic self-efficacy is a strong predictor of academic resilience, which could increase the likelihood of academic success despite environmental adversities (Cassidy, 2015; Jansen, Scherer, & Schroeders, 2015). Individuals with high self-efficacy set higher goals, exert more effort, and perform more challenging tasks than individuals with lower self-efficacy (Sorrenti et al., 2017). Furthermore, Minter and Pritzker (2015) reported positive correlations between academic self-efficacy and grade point average, homework completion rates, attendance, and educational goals pertaining to postsecondary education and career choice. Additionally, Minter and Pritzker (2015)

reported negative correlations between academic self-efficacy and behavior problems and retention.

Knowledge of academic self-efficacy levels can guide curriculum development that fosters instruction and can lead to increased confidence and perseverance (Honicke & Broadbent, 2016). Educators can aid in developing students' self-efficacy by providing opportunities and tools to learn how to handle success and failure, examples of how to behave under specific circumstances, and guidance on time management and goal setting (Köseoğlu, 2015). In addition, providing feedback on successful performances can increase academic self-efficacy (Brown et al., 2016).

Cassidy (2015) found academic self-efficacy training can help students face adversity in a healthy manner, which enables students to meet academic demands necessary for success. Bandura (1994) claimed schools that employ ability grouping and competitive practices isolate less-talented individuals and diminish self-efficacy, whereas schools that individualize instruction promote success and perceived capability and increase self-efficacy levels. Subsequently, Bandura (1994) stated, "Skilled efficacy builders encourage people to measure their success in terms of self-improvement rather than in terms of triumphs over others" (p. 46). Positive emotions of pride and enjoyment can also foster a higher self-efficacy (Villavicencio & Bernardo, 2016). According to Caprara et al. (2011), parents and teachers who teach students to set and monitor goals can help students realize their potential; building self-efficacy at an early stage in life can promote high academic performance.

Social self-efficacy. Social self-efficacy can predict adolescents' personal growth (Bendre & Mardhekar, 2018) and the ability to face social challenges (Minter & Pritzker,

2015). Additionally, socially efficacious people tend to display assertiveness in social situations, resolve conflict, and develop friendships (Bendre & Mardhekar, 2018; Kaur, 2017). Social self-efficacy can enhance social engagement, which can be demonstrated through positive peer interaction during a lesson, notably through cooperative learning (Martin & Rimm-Kaufman, 2015; Kaur, 2017). According to Minter and Pritzker (2015), low social self-efficacy can increase peer pressure and risky behavior. There is a great need for parents, educators, counselors, and coaches to strengthen social self-efficacy in all adolescents, a notably diverse and vulnerable group of students (Bendre & Mardhekar, 2018; Minter & Pritzker, 2015).

Emotional self-efficacy. Emotional self-efficacy involves self-beliefs related to the management of emotions, specifically in situations that require self-confidence (Muris, 2001). According to Gharetepeh et al. (2015), people with high emotional self-efficacy can easily adapt to life situations and use effective coping strategies. Researchers have suggested a positive relationship between emotional self-efficacy and academic achievement (Armum & Chellappan, 2016; Gharetepeh et al., 2015). Additionally, Muris (2001) found a positive correlation between low levels of emotional and academic self-efficacy and depression among adolescents. Moreover, Gharetepeh et al. (2015) suggested low emotional self-efficacy can be linked with poor stress management and anxiety. Recently there has been evidence to suggest emotional functioning can improve with the use of interventions to promote healthy ways of coping with stressful situations (Maddux, 2016).

Summary

Chapter Two served as a review of literature on the significance of differentiated instruction, specifically learner diversity in personality, self-efficacy, and learning style preference. The literature review included an overview of differentiated instruction, including research on student perceptions and implementation. Presented thereafter was information on the Big Five personality types. Differences between the Big Five personality types and self-efficacy domains, as well as differences in the Big Five personality types and learning style preferences, were stated. Next, learning styles, learning inventories, and the differences between learning style preferences and self-efficacy were reported. Lastly, Bandura's (1994) social cognitive theory was presented with attention to self-efficacy and the three domains of self-efficacy.

In Chapter Three, the problem and purpose overview, research questions, and research design are presented. The population and sample, instrumentation, reliability and validity, data collection, and data analysis are described. Finally, ethical considerations are stated.

Chapter Three: Methodology

Policymakers, administrators, and teachers are expected to meet the needs of all

learners (Grant & Jones, 2016). To meet individual needs, educators can use students'

interests and assessments to identify strengths and weaknesses to differentiate instruction

(Othman, Shahrill, Mundia, Tan, & Huda, 2016; Stover et al., 2016). Purposive sampling

was used to select five high schools to participate in this study regarding differentiated

instruction. Three valid and reliable surveys were used to collect data on personality

type, self-efficacy domain, and learning style preference. A chi-square analysis of the

data was used to answer the stated research questions. This chapter contains details on

the problem, research questions, population and sample, instrumentation, data collection

and data analysis procedures, and ethical considerations of the research study.

Problem and Purpose Overview

In 2015, President Obama signed a bipartisan measure entitled the Every Student

Succeeds Act to replace the No Child Left Behind Act (Young, Winn, & Reedy, 2017*).*

The purpose of the Every Student Succeeds Act was to close academic achievement gaps

by providing every child with a fair, high-quality education (Young et al., 2017). In

March 2017, the updated state template was introduced to promote "innovation,

flexibility, and accountability to ensure every child has a chance to learn and succeed"

(Young et al., 2017, p. 5). According to Givens (2018), "Over the past several decades

there has been a continuous stream of government mandates aimed to improve equity,

access, accountability, transparency, student performance, and/or expand the

responsibilities of public schools" (p. iii). Of importance, Valiandes (2015) determined

teachers who use differentiated instruction address equity using high-quality,

contemporary pedagogy. The importance of this research stems from the belief that a better understanding of learner differences can help all students reach their potential (Freedman, 2015).

Research questions and hypotheses. The following research questions and hypotheses guided the study:

1. What difference, if any, exists between student personality type and learning style preference?

$H1_0$: There is no statistically significant difference between student personality type and learning style preference.

$H1_a$: There is a statistically significant difference between student personality type and learning style preference.

2. What difference, if any, exists between student self-efficacy domain and learning style preference?

$H2_0$: There is no statistically significant difference between student self-efficacy domain and learning style preference.

$H2_a$: There is a statistically significant difference between student self-efficacy domain and learning style preference.

3. What difference, if any, exists between student personality type and self-efficacy domain?

$H3_0$: There is no statistically significant difference between student personality type and self-efficacy domain.

$H3_a$: There is a statistically significant difference between student personality type and self-efficacy domain.

Research Design

      The methodology for this study was quantitative and involved inferential statistics to analyze data collected through online surveys. According to Seltman (2018), "Quantitative variables are those for which the recorded numbers encode magnitude information based on a true quantitative scale" (p. 13). Inferential statistics involves generalizing from samples to populations based on relationships among variables (Burkholder, Cox, Crawford, & Hitchcock, 2020; Creswell & Creswell, 2018). A quantitative research design was selected and used for this study to explore the problem and answer the research questions.

      Boudah (2020) suggested, "Survey research is appropriate when individual responses to a protocol of questions are the best form of data to answer the research questions" (p. 114). Surveys are used to study a sample of a population (Creswell & Creswell, 2018). Fraenkel, Wallen, and Hyun (2019) reported, "In educational research, the most common descriptive methodology is the survey, as when researchers summarize the characteristics (abilities, preferences, behaviors, and so on) of individuals or groups or (sometimes) physical environments (such as schools)" (p. 15). The data were collected with the aid of Qualtrics (2019), a cloud-based tool used to analyze survey data.

      According to Coolidge (2020), "Chi-square statistics are designed to determine whether an observed number differs either from chance of from what was expected" (p. 413). A chi-square goodness-of-fit test was used in this study because the following conditions were met: 1) the data were obtained from a random sample, 2) the expected frequency for each category was five or more in 80% of the cells, and 3) the variables were categorical (Stat Trek, 2019, para. 2). A chi-square goodness-of-fit test is a "non-

parametric test that is used to find out how the observed value of a given phenomenon is significantly different from the expected value" (Statistics Solutions, 2019, para. 1). Results of the chi-square analysis revealed whether there was a significant difference between the two categorical variables or not, which allowed the researcher to reject or not reject the null hypothesis for each research question.

Population and Sample

The population of a study is defined as the group of interest for the purpose of the study (Bergin, 2018; Fraenkel et al., 2019). The population for this study included all ninth-grade students ($n = 1,080$) from three counties in southwest Missouri for the 2019-2020 school year (Missouri Department of Elementary and Secondary Education [MODESE], 2019b). The sum of the population of the five selected schools was sufficient for a chi-square goodness-of-fit test because the expected frequencies met the criteria for this type of statistical analysis (Stat Trek, 2019, para. 3).

A sample is a representative part of a larger group (*Merriam-Webster's*, 2019). Of importance, Fraenkel et al. (2019) stated, "A sample should be as large as the researcher can obtain with a reasonable expenditure of time and energy" (p. 102). Specifically, Fraenkel et al. (2019) defined purposive sampling as a non-probability sample that allows researchers to "use their judgment to select a sample that they believe, based on prior information, will provide the data they need" (p. 100). According to Johnson and Christensen (2019), "In purposive sampling (sometimes called judgmental sampling), the researcher specifies the characteristics of a population of interest and then tries to locate individuals who have those characteristics" (p. 254). Subjects in a sample usually possess similar characteristics as those subjects in the population (Bluman, 2018).

In an effort to obtain data from high school students representing all socioeconomic backgrounds, all ninth-grade students in each school were asked to participate. Criteria for purposive sampling included the schools' proximity to each other and whether each school district's Annual Performance Report score was within a certain range. The Annual Performance Report score for a school district measures the "progress toward the goal that all students graduate high school college- and career-ready" (MODESE, 2019c, para. 1). This overall Annual Performance Report score is comprised of subscores for each of the Missouri School Improvement Program performance standards:

1) academic achievement

2) subgroup achievement

3) High School readiness (K-8 districts) or College and Career readiness (K-12 districts)

4) attendance rate

5) graduation rate (K-12 districts). (MODESE, 2019a, para. 1)

Proximity was determined by schools that fell within a 60-mile radius of a predetermined location. Once those schools were determined, the Annual Performance Reports for the 2017-2018 school year were obtained from the MODESE website to determine which schools fell within a 5.5% range of each other. The following are the Annual Performance Report scores for the five schools selected to participate in this study: School A = 89.2%; School B = 87.3%; School C = 90.2%; School D = 86.8%; and School E = 92.2% (MODESE, 2019c).

Ninth-grade students from five southwest Missouri school districts were asked to participate (see Table 1). Ninth graders were selected, because "research showed that freshman year experiences are pivotal and success is highly dependent on factors like high attendance in school and avoiding failures in coursework" (Easton et al., 2017, p. 2). Inferential statistics were used to generalize findings from the sample to the population (Bluman, 2018; Burkholder et al., 2020).

Table 1

Ninth-Grade Population for Participating Districts

School	Ninth-Grade Population
A	67
B	109
C	339
D	15
E	118
Total	648

The minimum sample size for this study was 129 participants, or 20% of the sample. The maximum sample size for this study was 648 participants, or 100% of the sample.

Instrumentation

Three predesigned surveys were selected as instruments to gather data for the study given their widespread use in research studies (Creswell & Creswell, 2018). According to Creswell and Creswell (2018), "Survey design provides a quantitative description of trends, attitudes, and opinions of a population, or tests for associations among variables of a population, by studying a sample of that population" (p. 147). The

surveys, accompanied by the scoring systems for the surveys (see Appendices A, B, & C), consisted of Likert-type scales, which were used to measure the level of agreement with particular items (McMillan, 2012).

The 50-item Big Five Personality Survey located on the International Personality Item Pool (IPIP) website consists of five subscales developed to measure the Big Five personality factor markers reported by Goldberg (1992). The Big Five Personality Survey includes the following categories: extroversion, agreeableness, conscientiousness, neuroticism, and openness to experience (Power & Pluess, 2015). This 50-item survey is scored on a five-degree, Likert-type scale ranging from 1 (disagree) to 5 (agree) with 10 items for each category (Open Psychometrics, n.d.). For each of the categories, the total score was calculated using a formula supplied by the maker of the survey; the category with the highest score represented the dominant personality type for each respondent (Open Psychometrics, n.d.).

The Self-Efficacy Survey for Children (SEQ-C), developed by Muris, measures a person's self-efficacy defined as the "judgment of the person's capabilities to undertake appropriate action that results in successful performance" (McMillan, 2012, p. 156). The SEQ-C Survey includes the following domains: Academic Self-Efficacy, Social Self-Efficacy, and Emotional Self-Efficacy (Muris, n.d.). This 24-item survey is scored on a five-degree, Likert-type scale ranging from 1 (Not at all) to 5 (Very well) with eight items for each category (Muris, n.d.). For each of the categories, the total score was calculated by totaling the responses to all eight items corresponding to each category (Muris, n.d.). The category with the highest summation value represented the dominant self-efficacy belief for each respondent (Muris, n.d.).

The Thinking and Learning Styles Survey was originally developed from Fleming's VAK model and provides learner profiles based on sensory modalities used to take in information (Sreenidhi & Helena, 2017). The Thinking and Learning Styles Survey includes the following categories: visual (V), auditory (A), kinesthetic (K), global (G), and analytic (A) (Whitten, Esteves, & Woodrow, 2019). The 40-item survey is scored on a three-degree, Likert-type scale ranging from 1 (This never describes me) to 3 (This often describes me) with eight items for each category (Whitten et al., 2019). For the purposes of this study, the items pertaining the categories of "global" and "analytic" were not analyzed. For each of the categories used in this study, the total score was calculated by summing all eight items corresponding to each category; the category with the highest summation value represented the dominant learning preference for each respondent (Whitten et al., 2019).

Reliability. The internal consistency of the International Personality Item Pool Big Five factor markers has been verified (Gow, Whiteman, Pattie, & Deary, 2005). Constantinescu and Constantinescu (2016) stated, "The research with the 50-item International Personality Item Pool representation of the Goldberg markers for the Big-Five factor structure yielded also cross-culturally empirical evidence in showing the instrument psychometrically sound" (p. 130). Moreover, Goldberg et al. (2006) determined all "items are correlated with each of the original inventory scales… when the original scales are part of a multi-scale inventory, each item is categorized by the scale with which it has its highest correlation" (p. 88). Subsequently, Goldberg et al. (2006) explained the advantages of using inventories on the International Personality Item Pool website as accessible, timely, collaborative, and global.

The SEQ-C was developed by Muris (2001) to measure social, academic, and emotional domains of self-efficacy. According to Muris (2001), "The internal consistency reliability of the Self-Efficacy Survey for Children appeared to be satisfactory: Cronbach's α were 0.88 for the total self-efficacy score and between .85 and .88 for subscale scores" (p. 146). The SEQ-C subscales were significantly intercorrelated (Muris, 2001).

The Thinking and Learning Styles Survey is a concrete survey designed to get students thinking about how they learn best and can be used to generate conversation between students and teachers to improve academic attainment (O'Brien, 1989). The Thinking and Learning Styles Survey was derived from the O'Brien's Learning Channel Preference Checklist and is currently published for educators to use as a tool to understand students' learning style preferences (O'Brien, 1989).

Validity. Researchers have demonstrated cross-observer validity (Costa & McCrae, 2008), predictive validity, along with factorial and concurrent validity (Gow et al., 2005) regarding the 50-item survey Constantinescu and Constantinescu (2016) formulated from the NEO Personality Inventory-Revised survey (NEO-PI-R). The NEO-PI-R survey is widely used and commonly cited in literature; not only is this survey used for research on personality, but it is also used clinically (Costa & McCrae, 2008).

According to Muris (2001), the SEQ-C is valid. Researchers support the construct validity of the SEQ-C with regard to social self-efficacy and emotional self-efficacy (Minter & Pritzker, 2015). The SEQ-C has gained popularity because it was developed with youth, is easy to complete, and is domain-specific (Minter & Pritzker, 2015).

The Thinking and Learning Styles survey was analyzed for face validity, meaning its content simply looks relevant to the person taking the test (Taherdoost, 2016). According to Taherdoost (2016), face validity is used to evaluate the appearance of the survey in terms of "feasibility, readability, consistency of style and formatting, and the clarity of the language used" (p. 29). The authors of the Thinking and Learning Styles survey have not field-tested the survey but believe the tool can be used to help teachers meet individual student needs (M. Whitaker, personal communication, April 24, 2019).

Data Collection

Data were collected after obtaining permission from the survey authors (see Appendices D, E, & F) and superintendents of the five selected school districts (see Appendix G). After receiving written permission from the survey authors and superintendents, a phone script for introductory phone calls to counselors was written (see Appendix H). After approval from the Lindenwood Institutional Review Board (see Appendices I & J), introductory phone contact with participating high school counselors was made to request an email address to send information about the study, including required documents, to discuss the role of the counselor in the study, and to answer any initial questions.

The building counselors distributed introductory letters outlining the investigation to all parents and students (see Appendices K & L). Additionally, the building counselors from three of the five selected districts gave all ninth-grade parents and/or guardians in their districts the Research Study Assent form and the Research Study Consent form (see Appendices M & N). The building counselors from the remaining two districts did not distribute the Research Study Assent form because students in those

districts had the opportunity to agree to the Research Study Assent form located within

Qualtrics prior to beginning the survey.

After proper consent was received from students and parents and/or guardians,

students completed the three selected surveys online with the use of a single mobile or

desktop link sent to them in an email from a data software company titled Qualtrics.

Qualtrics (2019) uses digital technology to anonymously distribute surveys to a select

group of respondents and is an efficient tool to yield high response rates and gather high-

quality data. The three selected surveys were arranged in blocks of a single survey in the

following order: (a) personality type, (b) self-efficacy, and (c) learning style preference.

The surveys were proctored by the counselor in a common location at a set time.

Before the respondents filled out the surveys, the counselor gave detailed instructions and

allowed students to ask questions to clarify any uncertainty. The respondents were

assured the results of the study were to be applied to research work and their responses

had nothing to do with evaluating them as individuals. Further, and more importantly,

the respondents were assured of their free will in participating in the study and they could

quit participation at any time. In the final analysis, only valid surveys filled out in

entirety were considered.

Data Analysis

Three independent variables were identified in this study: personality type, self-

efficacy, and learning style preference. Independent variables, in quantitative research,

are independent of all other influences (Creswell & Creswell, 2018; Johnson &

Christensen, 2019; Mertens, 2014). Initially, data collected from the three surveys were

organized and analyzed using Qualtrics. Response identification within Qualtrics de-

identified the students but allowed each student's responses for all three surveys to be linked and viewed simultaneously.

Statistical inference was used to estimate the likelihood the results were relevant to the population as a whole; the most common statistical tool for this is known as the chi-square test (Statistics How To, 2019). The chi-square test "measures the degree of association or linkage between two variables by comparing the differences between the observed values and expected values if no association were present, i.e. those that would be a result of pure chance" (Statistics How To, 2019, p. 122). Specifically, a chi-square goodness-of-fit test was used to determine whether there was a significant difference between two categorical variables for each research question: (a) personality type and self-efficacy domain, (b) personality type and learning style preference, and (c) learning style preference and self-efficacy domain.

A chi-square goodness-of-fit was appropriate because the following conditions were met: (a) the sampling method was simple random sampling; (b) the variables were each categorical; (c) the sample data were organized in a contingency table; and (d) the frequency count for each cell of the table was at least five in 80% of the cells (Stat Trek, 2019, para. 3). The results of the chi-square analysis revealed whether there was a significant difference between the two categorical variables or not, which allowed the researcher to reject or not reject the null hypothesis for each research question.

Ethical Considerations

Safeguards were established to ensure the participants in the study were protected and responses were anonymous (Creswell & Creswell, 2018). Participants were not asked to reveal their names. Although the email addresses of participants were utilized to

send emails with the link to the surveys, the surveys did not require any of the

participants to provide personally identifiable information; therefore, all responses were

kept confidential and anonymous. The hard copy list of email addresses was kept

confidential in a secure location, and any electronic storage of information will be kept

password-protected for three years (Fraenkel et al., 2019). All documents and files will

be destroyed three years from the completion date of the research project.

Participants were provided the Research Study Assent form from their school

counselors. The Research Study Assent form contained information pertaining to the

purpose of the study, protections, confidentiality, and anonymity for participants

(Fraenkel et al., 2019). Specifically, the Research Study Assent form detailed there were

no anticipated risks associated with the research and no direct benefits for participating in

the study (Creswell & Creswell, 2018). Participation was voluntary, participants could

have chosen not to answer any items, and participants were not penalized for not

participating or withdrawing from the study (Creswell & Creswell, 2018). The Research

Study Assent form also notified participants their responses would be destroyed after

three years from the completion of the study and stipulated their identities will not be

revealed in any publication or presentation which could result from the study (Fraenkel et

al., 2019).

Participants were provided the Research Study Consent form by their school

counselors. The Research Study Consent form contained information pertaining to the

purpose of the study, protections, confidentiality, and anonymity for participants

(Fraenkel et al., 2019). Specifically, the Research Study Consent form detailed the

following: there were no anticipated risks associated with this research and no direct

benefits for minors participating in the study; participation was voluntary; participants could have chosen not to answer any items; and participants were not to be penalized for not participating or withdrawing from the study (Creswell & Creswell, 2018). Upon reading the Research Study Consent form, parents or guardians understood participants' responses were kept confidential, will be destroyed after three years from the completion of the study, and stipulated the identities of the minors were not revealed in any publication or presentation which could result from the study (Fraenkel et al., 2019).

Summary

Following the research questions in Chapter Three, the research design, population for the study, and sample of the study were introduced. The instrumentation, along with the reliability and validity of each survey, was outlined. Data collection and data analysis were described in detail. Finally, ethical considerations and reassurances for the participants were explained.

Chapter Four includes a restatement of the purpose and problem along with a description of the participants of the study. Information on the variables and surveys is presented. Additionally, an in-depth summary of the chi-square goodness-of-fit test is provided followed by quantitative results of the surveys. Each research question is addressed separately.

Chapter Four: Analysis of Data

The purpose of this study was to determine if there were any significant differences in personality type, self-efficacy domain, and learning style preference among ninth-grade students in southwest Missouri. Ninth-grade students were emailed a Likert-type survey consisting of three blocks: 1) The Big Five Personality Survey, 2) The Self-Efficacy Survey, and 3) The Thinking and Learning Styles Survey. The survey was anonymous and distributed via a software company. Counselors of the five selected school districts distributed the consent and assent forms and proctored the survey. The data were analyzed to examine any differences among the aforementioned characteristics. In Chapter Four, the survey participants are re-defined, brief descriptions of the variables studied are mentioned, and analyses of the quantitative data from the chi-square goodness-of fit tests are presented.

Participants

The sample size sought was all ninth-grade students enrolled in public high schools in southwest counties of Missouri for the 2019-2020 school year. The school districts were selected based on proximity to each other as well as similar Annual Performance Report scores from the year prior to the study. The study was conducted in classrooms on campuses of five selected school districts. The participants accessed a digital link via their email addresses on computers or mobile devices.

A total of 148 responses were returned in the four-month period between November 2019 and February 2020. The overall response rate of the surveys from the five selected schools was 22.8%. Any survey not completed in entirety was not recorded. Additionally, any response that produced the same score for two or more variables was

not recorded, because one assumption for an accurate chi-square goodness-of-fit test is that categorical variables must be mutually exclusive (Laerd Statistics, 2018).

Variables and Surveys

The Big Five Personality Survey included the following categories: openness, conscientiousness, extroversion, agreeableness, and neuroticism (Goldberg et al., 2006). Of significance, Goldberg et al. (2006) found high correlations (.94) between this 50-item survey and the parent survey, the NEO-PI-R. The 50-item Big Five Personality Survey was chosen because of a limited amount of subject testing time (Goldberg, 1992). The personality types used in this survey are described in Table 2.

Table 2

Big Five Survey Personality Traits

Personality Trait	Description
Openness	seeks new experiences as opposed to predictability and structure
Conscientiousness	honest and hardworking as opposed to messy and taking the easy way out
Extroversion	highly social as opposed to working alone
Agreeableness	adjusts one's behavior to suit others as opposed to 'telling it like it is'
Neuroticism	very emotional as opposed to 'down to earth'

Located on the IPIP website, this 50-item survey was scored on a five-degree, Likert-type scale ranging from 1 (disagree) to 5 (agree) with 10 items for each category

(Open Psychometrics, n.d.). The first three items and Likert-type scale used on the Big

Five Personality Survey are located in Table 3.

Table 3

Sample Items from the Personality Type Survey

Sample Item	Likert-Type Scale
Am the life of the party.	1 = disagree 2 = slightly disagree 3 = neutral 4 = slightly agree 5 = agree
Feel little concern for others.	1 = disagree 2 = slightly disagree 3 = neutral 4 = slightly agree 5 = agree
Am always prepared.	1 = disagree 2 = slightly disagree 3 = neutral 4 = slightly agree 5 = agree

The dominant personality type was calculated using a formula provided by the

maker of the survey; the personality type subscale with the highest score represented the

dominant personality type of the participant (Open Psychometrics, n.d.). The sum for

each personality type must sum to be between 1 and 40 (Open Psychometrics, n.d.). The

Big Five Personality Test has been said to be quite useful in academic settings (Goldberg

et al., 2006). Participants who take this survey can use the results to identify with leisure

activities or understand mannerisms (Open Psychometrics, n.d.). The mean scores for each personality type are shown in Table 4.

The personality type with the highest mean was agreeableness (28), followed by consciousness (25) and openness (23). The personality type with the lowest mean was neuroticism (17). The highest maximum scores were extroversion and agreeableness; the lowest minimum score was extroversion. The survey revealed 14 respondents with two personality types yielding the same score. To validate the chi-square goodness-of-fit test, the responses with the same score for two or more personality types were not included in the chi-square goodness-of-fit calculation.

Table 4

Mean Scores for the Personality Type Survey

Personality Type	Minimum	Maximum	Mean
Openness	7	36	23
Conscientiousness	12	35	25
Extroversion	1	40	20
Agreeableness	14	40	28
Neuroticism	3	39	17

Note. n = 148.

The SEQ-C Survey, developed by Muris (2001), included three domains of self-efficacy; the self-efficacy domains are described in Table 5.

Table 5

SEQ-C Self-Efficacy Domains

Self-Efficacy Domain	Description
Academic	a child's ability to master his or her scholastic world
Social	a child's ability to manage social challenges
Emotional	a child's ability to resist peer pressure to engage in risky activities

This 24-item survey was scored on a five-degree, Likert-type scale ranging from 1 (Not at all) to 5 (Extremely well) with eight items for each self-efficacy type for a maximum score of 40 in each domain and a minimum score of eight in each domain (Muris, n.d.). The first three items and Likert-type scale used on the SEQ-C are located in Table 6.

Table 6

Sample Items from the Self-Efficacy Survey

Sample Item	Likert-Type Scale
How well can you get teachers to help you when you get stuck on schoolwork?	1 = not at all 2 = slightly well 3 = moderately well 4 = very well 5 = extremely well
How well can you express your opinions when other classmates disagree with you?	1 = not at all 2 = slightly well 3 = moderately well 4 = very well 5 = extremely well
How well do you succeed in cheering yourself up when an unpleasant event has happened?	1 = not at all 2 = slightly well 3 = moderately well 4 = very well 5 = extremely well

For each of the domains, the total score was calculated by totaling the responses to all eight items corresponding to each domain; the category with the highest score represented the dominant self-efficacy domain for that respondent (Muris, n.d.). The domains of the SEQ-C have been found to be significantly intercorrelated; Cronbach's alpha is .88 for total self-efficacy (Muris, 2001). Participants can use the results of the SEQ-C survey to set goals, make decisions, and regulate motivation and persistence with life activities (Minter & Pritzker, 2015). The mean scores for each self-efficacy domain are shown in Table 7.

The self-efficacy domain with the highest mean was social (25), followed by academic (24). The self-efficacy domain with the lowest mean was emotional (21). The

academic self-efficacy domain resulted in the highest maximum score; the emotional

self-efficacy domain resulted in the lowest minimum score. The survey revealed eight

respondents with two self-efficacy domains yielding the same score, and two respondents

with the same score on all three self-efficacy domains. To validate the chi-square

goodness-of-fit test, the responses with the same score for two self-efficacy domains

were not included in the chi-square goodness-of-fit calculation.

Table 7

Mean Scores for the Self-Efficacy Domain Survey

Self-Efficacy Domain	Minimum	Maximum	*M*
Academic	11	40	24
Social	11	38	25
Emotional	8	38	21

Note. n = 148.

The Thinking and Learning Styles Survey, developed by O'Brien, included the

following categories: visual (V), auditory (A), and kinesthetic (K) (Whitten et al., 2019).

Specifically, Sreenidhi and Helena (2017) described these representational learning styles

as noted in Table 8.

Table 8

Thinking and Learning Styles Survey: Learning Preferences

Learning Style Preference	Description
Visual	an ability to learn by seeing things
Auditory	an ability to learn by listening
Kinesthetic	an ability to learn by carrying out physical activity

The 24-item survey was scored on a three-degree, Likert-type scale ranging from 1 (This never describes me) to 3 (This often describes me) with eight items for each category for a maximum score of 24 and a minimum score of eight in each category (Whitten et al., 2019). The first three items and Likert-type scale used on the Thinking and Learning Styles Survey are located in Table 9.

Table 9

Sample items from the Thinking and Learning Styles Survey

Sample Item	Likert-Type Scale
I decorate my written work with pictures and doodles.	1 = This never describes me. 2 = This sometimes describes me. 3 = This often describes me.
When making a decision, I talk it over with someone.	1 = This never describes me. 2 = This sometimes describes me. 3 = This often describes me.
It is easier to find a new place when I look at a map rather than having someone tell me directions.	1 = This never describes me. 2 = This sometimes describes me. 3 = This often describes me.

For each of the categories, the total score was calculated by summing all eight items corresponding to each category; the category with the highest score represented the dominant learning preference for that respondent (Whitten et al., 2019). According to O'Brien (1989), the Thinking and Learning Styles inventory is used to identify sensory modalities students use to take in new information. Proponents attest students will learn best if taught in a method suited to their dominant learning style preference (Sreenidhi & Helena, 2017). The mean scores for each learning style preference are shown in Table 10.

The learning style preference with the highest mean was kinesthetic (17). The visual and auditory learning style preferences resulted in the lowest mean (16). The visual and kinesthetic learning preferences resulted in the highest maximum scores; the lowest minimum score was for auditory learners. The survey revealed 19 respondents were bimodal, and eight respondents were trimodal. To validate the chi-square goodness-of-fit test, the respondents with the same score for two learning style preferences were not included in the chi-square goodness-of-fit calculation.

Table 10

Mean Scores for the Learning Style Preference Survey

Learning Style Preference	Minimum	Maximum	M
Visual	12	23	16
Auditory	10	22	16
Kinesthetic	12	23	17

Note. $n = 148$.

Measurement

The chi-square goodness-of-fit test can be used to analyze whether an observed frequency fits an expected frequency (Bluman, 2018). The steps to computing the chi-square statistic for this test are as follows: 1) for each level, subtract the observed count (O) from the expected count (E), 2) square each of these differences, 3) divide each of these squared differences by the corresponding expected value, and 4) add all of the numbers from the previous steps together (Taylor, 2020). If the expected counts show no deviation from the observed counts, the chi-square statistic would equal zero; all other situations yield a positive number (Statistics How To, 2019).

The critical value for the chi-square distribution corresponds to a particular location on a chi-square distribution table with the appropriate number of degrees of freedom (the number of categories in the contingency table minus one) and the level of significance (Taylor, 2020). According to Bluman (2018), "The p-value is the probability of getting a sample statistic or a more extreme sample statistic in the direction of the alternative hypothesis when the null hypothesis is true" (p. 430). If the chi-square statistic is not in the 95% critical value accepted range and the p-value is less than or equal to the level of significance, the null hypothesis can be rejected (Statistics How To, 2019).

Quantitative Analysis of Research Questions

The following research questions and hypotheses were addressed in this study:

Research question one. What difference, if any, exists between student personality type and learning style preference?

$H1_0$: There is no statistically significant difference between student personality type and learning style preference.

$H1a$: There is a statistically significant difference between student personality type and learning style preference.

The observed frequencies varied, as opposed to the expected frequencies as shown in Table 11. A chi-square goodness-of-fit test was performed to determine whether there were significant differences between five personality types and three learning style preferences. The test statistic was statistically significant: χ^2 (14, $n = 106$) $= 112.49$, $p < .05$. Therefore, the null hypothesis was rejected as there were statistically significant differences in personality type and learning style preference. The smaller the p value ($p = 8.88178\ e^{-16}$), the more the alternative hypothesis was supported. The test statistic ($\chi^2 = 112.49$) exceeded the critical value (23.685), which reduced the chance of type I error, "hence it was not a great fit" (Bluman, 2018, p. 611).

Table 11

Observed and Expected Frequencies for Personality Type and Learning Style Preference

Personality Type and Learning Style Preference	Observed Frequency	Expected Frequency
Openness & Visual(O/V)	7	7.067
Conscientiousness & Visual (C/V)	1	7.067
Extroversion & Visual (E/V)	2	7.067
Agreeableness & Visual (A/V)	12	7.067
Neuroticism & Visual (N/V)	1	7.067
Openness & Auditory (O/A)	1	7.067
Conscientiousness & Auditory (C/A)	4	7.067
Extroversion & Auditory (E/A)	4	7.067
Agreeableness & Auditory (A/A)	13	7.067
Neuroticism & Auditory (N/A)	4	7.067
Openness & Kinesthetic (O/K)	4	7.067
Conscientiousness & Kinesthetic (C/K)	11	7.067
Extroversion & Kinesthetic (E/K)	9	7.067
Agreeableness & Kinesthetic (A/K)	30	7.067
Neuroticism & Kinesthetic (N/K)	3	7.067

Note. $n = 106$.

The data in Figure 1 revealed a significant difference between personality type and learning style preference in ninth-grade students representing three counties in

southwest Missouri. The highest-observed frequency was the personality type of agreeableness and a learning style preference of kinesthetic (O = 30/106). The lowest-observed frequencies were the visual learning style preference associated with the personality types of extroversion (O = 2/106), conscientiousness (O = 1/106), and neuroticism (O = 1/106).
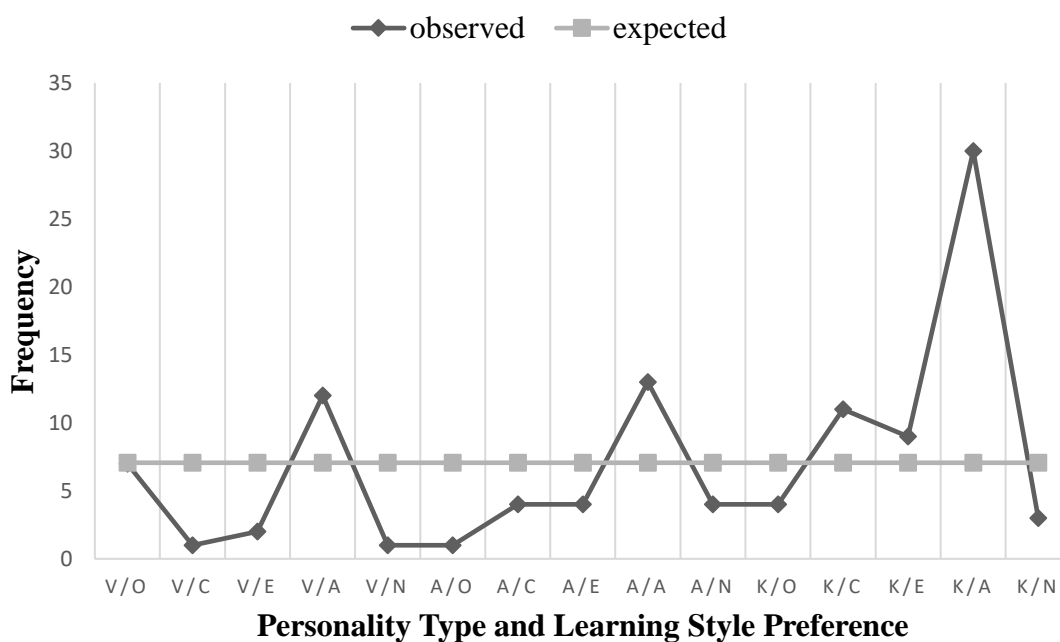
Figure 1. The observed and expected frequencies for personality type and learning style preference.

Research question two. What difference, if any, exists between student self-efficacy domain and learning style preference?

H2₀: There is no statistically significant difference between student self-efficacy domain and learning style preference.

H2ₐ: There is a statistically significant difference between student self-efficacy

domain and learning style preference.

The observed frequencies varied, as opposed to the expected frequencies as

reported in Table 12. A chi-square goodness-of-fit test was performed to determine

whether there were significant differences between three self-efficacy domains and three

learning style preferences. The test statistic was statistically significant: χ^2 (8, $n = 111$) =

32.43, $p < .05$. Therefore, the null hypothesis was rejected as there were statistically

significant differences in self-efficacy domains and learning style preference. The

smaller the *p* value ($p = .0000778813$), the more *₁*. The test statistic ($\chi^2 = 32.4$) exceeded

the critical value (15.507), which reduced the chance of type I error, "hence it was not a

great fit" (Bluman, 2018, p. 611).

Table 12

Observed and Expected Frequencies for Self-Efficacy Domain and Learning Style Preference

Self-Efficacy Domain and Learning Style Preference	Observed Frequency	Expected Frequency
Academic & Visual (A/V)	9	12.333
Social & Visual (S/V)	9	12.333
Emotional & Visual (E/V)	5	12.333
Academic & Auditory (A/A)	8	12.333
Social & Auditory (S/A)	17	12.333
Emotional & Auditory (E/A)	4	12.333
Academic & Kinesthetic (A/K)	21	12.333
Social & Kinesthetic (S/K)	24	12.333
Emotional & Kinesthetic (E/K)	14	12.333

Note. $n = 111$.

The data in Figure 2 revealed a significant difference between self-efficacy domain and learning style preference in ninth-grade students representing three counties in southwest Missouri. The learning styles preference with the highest-observed frequency was kinesthetic, prominently associated with social self-efficacy ($O = 23/111$) and academic ($O = 22/111$) domains. The learning style preference with the lowest-observed frequency was auditory, especially when coupled with emotional self-efficacy ($O = 4/111$).
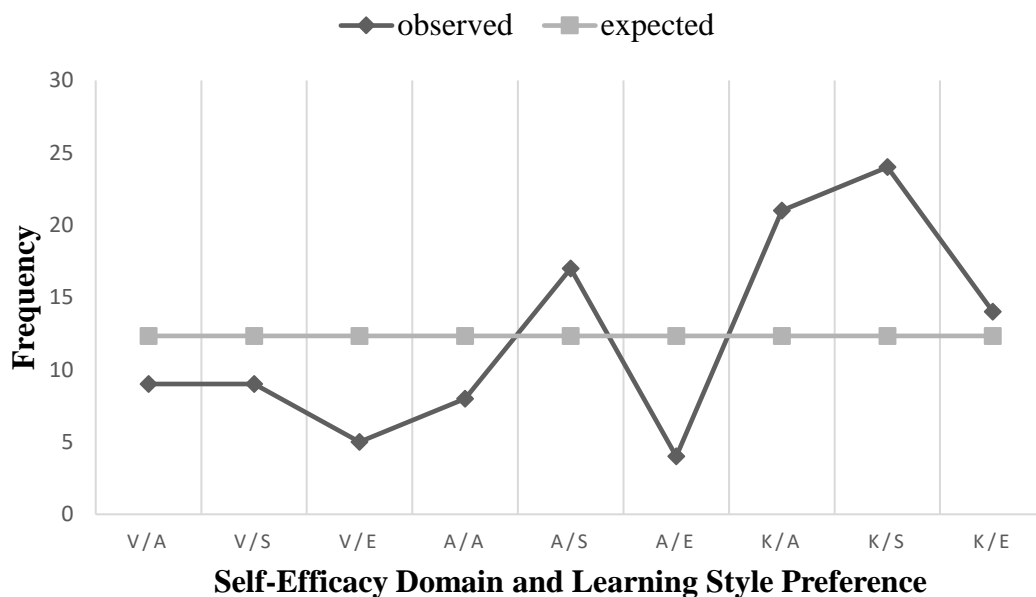
Figure 2. The observed and expected frequencies for self-efficacy domain and learning style preference.

Research question three. What difference, if any, exists between student personality type and self-efficacy domain?

H3₀: There is no statistically significant difference between student personality type and self-efficacy domain.

H3ₐ: There is a statistically significant difference between student personality type and self-efficacy domain.

The observed frequencies varied, as opposed to the expected frequencies as reported in Table 13. A chi-square goodness-of-fit test was performed to determine whether there were significant differences between five personality types and three self-efficacy domains. The test statistic is significantly significant, χ^2 (14, n = 121) = 112.67, $p < .05$. Therefore, the null hypothesis was rejected as there were significant differences

in personality type and self-efficacy domain. The chance of type I error (rejecting a

correct H_0) was small. The smaller the p value (p = -8.88178 e^{-16}), the more the

alternative hypothesis was supported H_1. The test statistic (χ^2 = 112.67) exceeded the

critical value (23.685), which reduced the chance of type I error, "hence it was not a great

fit" (Bluman, 2018, p. 611).

Table 13

Observed and Expected Frequencies for Personality Type and Self-Efficacy Domain

Personality Type and Self-Efficacy Domain	Observed Frequency	Expected Frequency
Openness & Academic (O/A)	3	8.067
Conscientiousness & Academic (C/A)	6	8.067
Extroversion & Academic (E/A)	4	8.067
Agreeableness & Academic (A/A)	26	8.067
Neuroticism & Academic (N/A)	1	8.067
Openness & Social (O/S)	9	8.067
Conscientiousness & Social (C/S)	7	8.067
Extroversion & Social (E/S)	9	8.067
Agreeableness & Social (A/S)	28	8.067
Neuroticism & Social (N/S)	2	8.067
Openness & Emotional (O/E)	2	8.067
Conscientiousness & Emotional (C/E)	6	8.067
Extroversion & Emotional (E/E)	6	8.067
Agreeableness & Emotional (A/E)	6	8.067
Neuroticism & Emotional (N/E)	6	8.067

Note. $n = 121$.

The data in Figure 3 revealed a significant difference between personality type and self-efficacy domain in ninth-grade students representing three counties in southwest Missouri. The personality type with the highest-observed frequency was agreeableness,

markedly associated with social self-efficacy (O = 30/121), followed by academic self-efficacy (O = 26/121). The lowest-observed frequency was neuroticism and academic self-efficacy (O = 1/121). Other notable low-observed frequencies were neuroticism and social self-efficacy (O = 2/121) as well as openness and emotional self-efficacy (O = 2/121).

Figure 3. The observed and expected frequencies for personality type and self-efficacy domain.

Summary

The participants involved in the study were re-stated. The variables in the three surveys were discussed and analyzed with sample items from the surveys. An in-depth summary of the chi-square goodness-of-fit test was presented. The research questions and hypotheses were stated, and data were delineated showing the results of the

responses. The percentage of surveys returned was 22.8%. The data analysis revealed

significant differences among all three variables; therefore, all three null hypotheses were

rejected, and the alternative hypotheses were supported.

Major elements of the study are presented in Chapter Five. Findings from the

quantitative data analysis presented in Chapter Four are communicated. Conclusions are

discussed, and suggestions for implications for practice are communicated. Finally,

recommendations for future research are stated.

Chapter Five: Summary and Conclusions

This study was conducted to determine any significant differences among personality type, learning style preference, and self-efficacy domain among ninth-grade students in southwest Missouri. Chapter Five begins with presenting findings from the data depicted in Chapter Four. Then conclusions are presented based on the findings. Built from the literature review and results of this investigation, implications for future research are provided. Lastly, recommendations for future research are put forth to give other researchers ideas on how to continue building on the topic of addressing learner differences in an age of increasing learner diversity.

Findings

The data presented in Chapter Four were used to determine the findings. The highest and lowest means for each variable were reported. In addition, the salient observed and expected frequencies for each research question were provided. Lastly, the chi-square statistics on the differences for each research question were detailed, as well as whether any significant differences were found.

Research question one. What difference, if any, exists between student personality type and learning style preference?

$H1_0$: There is no statistically significant difference between student personality type and learning style preference.

$H1a$: There is a statistically significant difference between student personality type and learning style preference.

The null hypothesis for research question one was rejected, and the alternative hypothesis was supported. The most-significant difference between personality type and

learning style preference was agreeableness and kinesthetic (28%). The second-most significant difference was agreeableness and auditory (12%). The third-most significant difference was agreeableness and visual (11%). The highest mean for personality type was agreeableness with a mean score of 28 based on a range of 1 to 40. The highest mean for learning style preference was kinesthetic, with a mean score of 17 based on a range of 8 to 24.

The least-significant differences between personality type and learning style preference (0.94%) were as follows: (a) openness and auditory, (b) conscientiousness and visual, and (c) neuroticism and visual. The lowest mean for personality type was neuroticism with a mean score of 17 based on a range of 1 to 40. The lowest means for learning style preference were visual and auditory, both with mean scores of 16 based on a range of 8 to 24. The means for all three learning style preferences fell within 4% of each other.

Research question two. What difference, if any, exists between student self-efficacy domain and learning style preference?

H2$_0$: There is no statistically significant difference between student self-efficacy domain and learning style preference.

H2$_a$: There is a statistically significant difference between student self-efficacy domain and learning style preference.

The null hypothesis for research question number two was rejected, and the alternative hypothesis was supported. The most-significant difference between self-efficacy domain and learning style preference was social and kinesthetic (22%). The second-most significant difference was academic and kinesthetic (19%). The third-most

significant difference was social and auditory (15%). The highest mean for self-efficacy domain was social with a mean score of 25 based on a range of 8 to 40. The highest mean for learning style preference was kinesthetic with a mean score of 17 based on a range of 8 to 24.

The least-significant difference between self-efficacy domain and learning style preference was emotional and auditory (5%). The second-least significant difference was emotional and visual (4%). The lowest mean for self-efficacy was emotional, with a mean score of 21 based on a range of 8 to 40. The means for all three-self-efficacy domains fell within 10% of each other. The lowest means for learning style preference were visual and auditory, both with mean scores of 16 from a range of 8 to 24.

Research question three. What difference, if any, exists between student personality type and self-efficacy domain?

$H3_0$: There is no statistically significant difference between student personality type and self-efficacy domain.

$H3_a$: There is a statistically significant difference between student personality type and self-efficacy domain.

The null hypothesis for research question number three was rejected, and the alternative hypothesis was supported. The most-significant difference between personality type and self-efficacy domain was agreeableness and social (23%). The second-most significant difference was agreeableness and academic (21%). The other differences between personality type and self-efficacy domain calculated for this research question were equal to or below 9%.

The least-significant difference between personality type and self-efficacy domain was neuroticism and academic with one respondent (1%). The second-least significant differences were neuroticism and social along with openness and emotional, both with only two respondents (2%).

Conclusions

The findings from Chapter Four and the review of literature were used to formulate conclusions. The highest and lowest means for each variable were determined, then data were used to draw conclusions on the differences for each research question. Also, connections between findings and characteristics of ninth-grade students were revealed. Lastly, notable findings such as respondents who identified with multimodal learning styles or exhibited two or more equal scores for personality types or self-efficacy domains were stated.

Research question one. What difference, if any, exists between student personality type and learning style preference?

The personality type with the highest mean among ninth-grade students in southwest Missouri was agreeableness, followed by conscientiousness. Similar results were reported in a study of higher education students (Afzaal et al., 2019). The popularity of agreeableness could be due in part to the fact that freshmen want to fit in and strive for harmony to lessen the uncertainties they face during this transitional year. According to Emerson et al. (2016), students' personality types can influence preferred learning styles and opinions on assignments and tasks. Worth mentioning is the percentage of students (9.5%) who identified with two personality types equally.

The most-significant difference was between the agreeableness personality type and the kinesthetic learning style preference. Over half of the sample had the personality type of agreeableness, and over half of the sample had the kinesthetic learning style preference. It is logical those with agreeableness personalities are comfortable when presented with hands-on experiences.

Researchers have determined the most-popular learning style preference is kinesthetic (Afzaal et al., 2019; Kharb et al., 2013; Sreenidhi & Helena, 2017) or interactive (Murphy et al., 2017). Kinesthetic learning activates the cerebellum, allowing individuals to store and manage information by accepting and processing through activity (Leasa et al., 2017). The respondents had nearly an equal preference for the auditory and visual learning style preferences. Recently, Sreenidhi and Helena (2017) stated, "Young children are all kinesthetic learners" (p. 18). According to Leasa et al. (2017), young learners prefer kinesthetic learning styles, while older learners tend to prefer visual methods.

As students progress from high school to college, they develop bimodal or multimodal learning style preferences (Leasa et al., 2017). In this study, the percentage of students who were bimodal was 13%, and the percentage of trimodal students was 5.4%. The data from this study supported the validity data of the VAK: more students have been reported as bimodal than trimodal, and the reported percentages of students who exhibit different learning style preferences are kinesthetic (26%), visual (7%), and auditory (6%) (Sreenidhi & Helena, 2017).

The personality type with the lowest mean among ninth-grade students in southwest Missouri was neuroticism. According to Sulea et al. (2015), neuroticism can

be associated with boredom, burnout, and low engagement. The learning style preference least identified with neuroticism in this study was visual. This was not surprising due to the fact visual learners are organized, seem to understand complex charts and maps, and prefer informal seating arrangements (Sreenidhi & Helena, 2017). These characteristics are not common in the typical freshman classroom. Interestingly, when the visual learning preference was paired with conscientiousness and neuroticism, only one respondent was reported in each case. There was little difference (1.9%) between visual and extroversion. Less than 1.0% of the respondents had the personality type of extroversion and the learning preference of auditory. This is perhaps because the warm and outgoing personality traits of extroverted students lend well to working with others on kinesthetic tasks (Dutt & Kumari, 2016).

Research question two. What difference, if any, exists between student self-efficacy domain and learning style preference?

The social self-efficacy domain was reported as the highest mean among ninth-grade students in southwest Missouri. The emotional self-efficacy domain was reported with the lowest mean among the same sample population. The most-significant difference was between the social self-efficacy domain and the kinesthetic learning preference. Since kinesthetic learning involves active learning, it makes sense that physical activity has significant connections to personal growth, such as increased self-image, increased self-esteem, and fewer depressive symptoms (Bendre & Mardhekar, 2018). In addition, the social desirability of freshmen is obvious as most feel comfortable working in groups (Martin & Rimm-Kaufman, 2015).

Another significant difference was between the academic self-efficacy domain and the kinesthetic learning style preference. Notably, "high levels of academic self-efficacy are important to sustaining students' motivation, participating in learning, putting forth effort, achieving desired performance levels, and protecting against academic failure at later stages, as well as other difficulties, such as childhood depression" (Ansong et al., 2016, p. 1058). Social self-efficacy and academic self-efficacy could contribute to kinesthetic learning in classrooms because students today like to take an active role in what once was a teacher-centered, traditional lecture method.

The self-efficacy domain and learning style preference with the lowest number of respondents were emotional and auditory. This finding is not surprising because many ninth-grade students experience social and developmental changes, new social pressure, and increased academic rigor (Walker, 2016). According to Kovacs (2018), ninth-grade students seek approval from their peers and long for independence.

Research question three. What difference, if any, exists between student personality type and self-efficacy domain?

Agreeableness and social self-efficacy were reported as dominant in the analysis of research questions one and two; it then makes sense the most-significant difference for research question three was agreeableness and social. According to Dutt and Kumari (2016), traits of agreeableness such as kindness and sympathy correspond to high social efficacy. This pairing was closely followed by agreeableness and academic self-efficacy.

The pairings of personality type and self-efficacy with the lowest number of respondents were neuroticism and academic self-efficacy, along with neuroticism and social self-efficacy. The emotional instability of neurotic individuals lends to low self-

efficacy in general. Naturally, neuroticism lowers academic self-efficacy, which in turn decreases academic performance and academic achievement (Caprara et al., 2011). Interestingly, the openness and emotional self-efficacy pairing was equally as insignificant. Openness has been linked to mental maturity (Qaisy & Thawabieh, 2016), intellectual ability, and elaborative processing (Berlin et al., 2016; Khatibi & Khormaei, 2016), which could signify that as ninth-grade students progress through high school, characteristics of this personality trait could further develop.

Implications for Practice

From this study, significant differences in personality types, learning style preferences, and self-efficacy domains were revealed among ninth-grade students in southwest Missouri. The results support the need for differentiating instruction. The first implication for practice is that students' self-awareness of characteristics such as personality, learning style preference, and self-efficacy can be empowering (Kharb et al., 2013; Khatibi & Khormaei, 2016).

Students' self-awareness of characteristics. According to Kharb et al. (2013) and Puji and Ahmad (2016), students who know their learning style preference have more self-confidence and develop into life-long learners. Therefore, if teachers survey their students at the beginning of the school year to create learner profiles and share that information with the students, students can develop a much better understanding of themselves, a better understanding of others, and proceed with confidence when learning new information, participating in activities, and preparing for assessment. Moreover, self-awareness of learner characteristics, namely learning style preference, can increase achievement (Khatibi & Khormaei, 2016; Moayyeri, 2015; Puji & Ahmad, 2016).

In addition, if teachers are aware of their learning style preferences, they can reflect on what methods they use to deliver instruction most often (Murphy et al., 2017). This reflection could be valuable because it may shed light on the fact many teachers teach using the learning style they are most comfortable with instead of ensuring all learning styles are included. According to Dunn et al. (2008), if teachers reflect on their philosophy of education holistically and communicate that information with colleagues, they can become self-motivated, which could then have a positive impact on student learning and achievement.

Teachers' awareness of student differences. The second implication for practice is teachers' awareness of student differences. Most commonly, this attainment of knowledge can be accomplished using diagnostic tools and needs assessment surveys (Freedman, 2015). When teachers are aware of characteristics such as personality, learning style preference, and self-efficacy, they can offer individual support (Djigić et al., 2016), make students feel more comfortable in their learning environment (Vasileva-Stojanovska et al., 2015), and optimize the educational experience (Tahiri et al., 2017).

This study focused on three characteristics of learners: personality type, learning style preference, and self-efficacy. Teachers who understand all personality types can relate to each student on a more personal level, have more empathy, and maximize flexible grouping strategies within their classrooms. Specifically, teachers can increase student engagement; develop meaningful, life-long relationships (Djigić et al., 2016); and make learning more pleasurable (Sulea et al., 2015).

Because personality is consistent over time and can define worldviews, an increase in achievement is evident when classroom expectations and personality

characteristics coincide (Hakimi et al., 2011). Specifically, learning tasks associated with descriptions of the Big Five personality types include the following: (a) openness—individuals who are naturally curious and experience success with compare and contrast questions as well as categorizing tasks; (b) conscientiousness—students who are responsible, appreciate deadlines and can benefit from "How to" study guides; (c) extroversion—people who thrive with cooperative learning and class discussion where they can express their opinions; (d) agreeableness—students will follow instructions and enjoy group activities as well as memorizing facts; and (e) neurotic individuals—those who do not have well-documented strategies to help them succeed in academic settings, however they seem to perform best with surface learning activities (Junaid, 2017).

Most ninth-grade students identified with the personality type of agreeableness; therefore, teachers of freshmen should give clear instructions, ensure students are mastering the lower levels of Bloom's taxonomy, and explore opportunities for group activities in and out of the classroom. Since the majority of ninth-grade students identified with agreeableness and the kinesthetic learning preference, teachers of ninth-grade students should make sure they offer active, group-based lessons on a regular basis. These pedagogical strategies would also meet the needs of ninth-grade students who identified with either academic or social self-efficacy domains.

When teachers understand learning style preferences, they can offer individual support as well as increase student motivation (Djigić et al., 2016). The importance of students taking learning style inventories is that educators could better understand their needs before and after instruction (Tomlinson, 2017). If teachers can match instructional delivery, activities, and assessments with students' preferred learning preferences, not

only could students benefit academically (Freedman, 2015), they could experience increased life satisfaction (Hamdani, 2015).

It is critical for teachers to use a variety of strategies to make sure all learning styles are addressed during instruction as often as possible (Ibrahim & Hussein, 2016; Jayakumar et al., 2017). This practice ensures that although students typically have one dominant learning style preference, they have the opportunity to strengthen all learning modalities (Ahvan & Pour, 2016). Strategies teachers can employ to reach each learning preference include the following: (a) visual—pictures and graphs; (b) auditory—notes and discussion; and (c) kinesthetic—hands-on activities and laboratory investigations (Sreenidhi & Helena, 2017).

Teachers who understand the self-efficacy domains of students are able to boost students' self-confidence (Honicke & Broadbent, 2016) and teach them life-long soft skills that will enable them to be successful. Strategies teachers can use to model and teach self-efficacy include (a) providing opportunities to learn how to handle success and failure, (b) providing guidance on time management and goal setting, (c) clarifying expectations, (d) giving specific feedback, and (e) recognizing successful performances (Brown et al., 2016; Köseoğlu, 2015; Schunk & DiBenedetto, 2016). Attention to the self-efficacy domains of students can help students cope, face adversity, and prepare for future demands (Cassidy, 2015).

Educators can promote self-efficacy through teacher training (Freedman, 2015), curricular adjustments targeting self-efficacy skills (Subban & Round, 2015), and differentiating instruction (Tomlinson, 2015). Strategies to increase the three self-efficacy domains include the following: (a) academic—help students set goals and ask

them to perform challenging tasks (Sorrenti et al., 2017); (b) social—use cooperative

grouping and encourage discussion ((Martin & Rimm-Kaufman, 2015); and (c)

emotional—introduce coping mechanisms and offer ideas to reduce anxiety (Gharetepeh

et al. (2015). Most ninth-grade students identified with the social self-efficacy domain.

Therefore, teachers of freshmen need to encourage class discussion and allow

opportunities for each student to respond using strategies such as jigsaw or low-stakes

writing. When teachers insist every student can succeed with hard work, they instill

efficacious beliefs into their students, allowing for a growth mindset (Sousa &

Tomlinson, 2018).

     A foundational approach to differentiating instruction. The third implication

for practice is the foundational approach to differentiating instruction. Unfortunately,

differentiated instruction is not well-understood and is inconsistent and unpopular among

teachers who feel the practice takes too much planning time and disrupts their classroom

management routine (Gaitas & Martins, 2016; Guay et al., 2017). Training for preservice

teachers could enable new teachers to feel comfortable creating learner profiles and

differentiating instruction from day one (Andronic & Andronic, 2016; Brevik et al., 2018;

Gaitas & Martins, 2016).

     For veteran teachers, ongoing professional development, professional learning

communities, and a sustained effort from all stakeholders are instrumental in

understanding and catering to learner differences (Gaitas & Martins, 2016). The most-

common strategies used by teachers to implement differentiated instruction are to start

small (Birnie, 2015), have students track their progress as much as possible (Aftab,

2015), and look for pre-made needs assessments and templates such as choice boards

(Marshall, 2016). Teachers new to differentiating instruction should understand the pedagogical process is not to prepare a separate lesson for each student each day.

      Creating easy-to-use templates and strategies for differentiated instruction to be carried out with fidelity. The fourth implication for practice is creating easy-to-use templates and strategies for differentiated instruction to be carried out with fidelity. A teacher who differentiates instruction successfully is aware of learner diversity, uses varied approaches, reflects the needs of all students, finds alternate pathways to move students forward and backward through the curriculum, and creates a safe and inviting environment with expectations and norms (Tomlinson, 2017). Class and school environments should promote active involvement and be flexible enough to emphasize students' strengths while working on their weaknesses (Sousa & Tomlinson, 2018).

      To help teachers understand the differences between a differentiated classroom and one that is not, a summary of the differentiated continuum is provided in Table 14 (Tomlinson, 1999). According to Tomlinson (2017), teachers can differentiate content, process, and product. Moreover, if teachers allow students to see the relevancy of the lesson, the students will be inclined to work harder (Sousa & Tomlinson, 2018). To differentiate content, teachers can vary resources based on different reading levels, attention levels, or abilities to access information (Santangelo & Tomlinson, 2009).

Table 14

Differentiation Continuum

Not Differentiated	Fully Differentiated
Assessment is at the end.	Assessment is ongoing.
A single form of assessment is used.	Diagnostic assessment is used.
Teacher directs student behavior.	Teacher scaffolds self-reliant learning.
Instruction is whole class.	Flexible grouping is practiced.
Coverage of texts and curriculum drive instruction.	Materials area varied.
Intelligence is viewed narrowly.	Multiple forms of intelligence are valued.
Single option assignments.	Assignments offer multiple options.
Time is inflexible.	Time is flexible in terms of student needs.
Teacher solves problems.	Teacher facilitates student problem-solving.
Grading is based on teacher-set, inflexible objectives.	Grading is determined by learning goals.

Note. Adapted from *The Differentiated Classroom: Responding to the Needs of All Learners* (1st ed.) by C. A. Tomlinson, 1999. Copyright 1999 by ASCD.

Process is another category in which differentiation can take place (Tomlinson, 2015). Common strategies that are easy to find and use include templates for choice boards, diner menus, cubing, and other tiered assignments (Hollas, 2007). Teachers or instructional coaches can use or make differentiated instruction templates that are easily accessible for any grade level or content area (Hollas, 2007). Choice boards can be

powerful tools if students or teachers are aware of defining characteristics associated with

the learning process (Tomlinson, 2017). Additionally, choice boards can be specific or

general and work for differentiating content, process, or product (Tomlinson, 2017).

Examples of choice boards are presented in Tables 15, 16, and 17.

Table 15

Differentiated Instruction Choice Board for Personality Type and Learning Style Preference

Personality Types	Visual	Auditory	Kinesthetic
Openness	Posters	Musical activities	Comic strips
	Categorize	Artistic activities	Doodling
	Make models	Use of curiosity	Mind-body connection
	Use of imagination		
Conscientiousness	Charts	Good directions	Copy notes
	Detailed notes	Writing stuff down	Follow lab procedures
	Handouts	Lecture	Manipulatives
	Timelines		
Extroversion	Group video	Speeches	Games
	Group presentation	Listening	Re-enactments
	Showing others	Foreign language	Field trips
		Summarize out loud	Demonstrations
Agreeableness	Partner posters	Group presentation	Talk/walk study
	Partner concept map	Q/A sessions	Lab partners
	Watch lessons	Study groups	Feel/touch
	Follow directions	Conversation	
Neuroticism	Highlighting	Mnemonics	Quiet place to study
	Memorize facts	Imagery	Museum
	Note-taking	Audio books	Label and classify
		Lecture	Journaling

Note. Adapted from *How to Differentiate Instruction in Academically Diverse*

Classrooms (3rd ed.) by C. Tomlinson, 2017. Copyright 2017 by ASCD.

Table 16

Differentiated Instruction Choice Board for Self-Efficacy Domain and Learning Style Preference

Self-Efficacy Domain	Visual	Auditory	Kinesthetic
Academic	Note taking	Watch documentaries	Digital learning
	Worksheets		Technology use
	Concept maps	Controlled discussions	Manipulatives
	Flashcards		
Social	Group posters	Discussion	Laboratories
	Making videos	Q/A sessions	Learning centers
	Cooperative learning	Songs/rhymes	Field Trips
		Study groups	Games
Emotional	Journaling	Speaking	Acting
	Social media/blogs	Music	Reflection
	Mind mapping	Acting	Explore emotions
		Study out loud	

Note. Adapted from *How to Differentiate Instruction in Academically Diverse Classrooms* (3rd ed.) by C. Tomlinson, 2017. Copyright 2017 by ASCD.

Table 17

Differentiated Instruction Choice Board for Personality Type and Self-Efficacy Domain

Personality Types	Academic	Social	Emotional
Openness	Modeling	Music	Journaling
	Maps	Art/creativity	Acting
	Posters	Learning centers	Speaking
	Digital assignments	Games	
Conscientiousness	Note-taking	Laboratories	Writing
	Worksheets	Study groups	Reflections
	Handouts	Group projects	Speaking
	Flash cards	Puzzles	Review sessions
Extroversion	Presentations	Field trips	Social media
	Discussion	Games	Speaking
	Games	Discussion	Acting
	Demonstrations	Making videos	Discussion
Agreeableness	Controlled discussion	Cooperative learning	Partner work
	Partner work	Study groups	Watch lessons
	Follow directions	Lab partners	Follow directions
	Controlled discussion	Discussion	Cooperative learning
Neuroticism	Label and classify	Peer tutoring	Journaling
	Memorize facts		Reading
	Read		Poetry
	Documentaries		Art

Note. Adapted from *How to Differentiate Instruction in Academically Diverse*

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Additionally, teachers can vary the complexity of the task, the number of variables in the task, or the use of models (Sousa & Tomlinson, 2018). Scaffolding, a technique used to progressively move students toward understanding and autonomy, is ideal in a differentiated classroom (Santangelo & Tomlinson, 2009). Also, the use of rubrics can help guide all students in meeting or exceeding expectations (Tomlinson, 2015).

Product, or assessment, is a third avenue for differentiating instruction Tomlinson, 2015). Teachers can create authentic assessments based on learning style preferences and self-efficacy domains (Stover et al., 2016; Subban & Round, 2015). For most students to be successful with a product or assessment, teachers need to work with students to formulate a plan, set personal goals, and monitor progress. Some examples of products or assessments include exit cards, student reflections, portfolios, essays, traditional testing (Hollas, 2007), and digital performance events (Favaretto et al., 2017).

Flexible grouping. The fifth implication for practice is for teachers to use flexible grouping often. Teachers can group students using homogenous or heterogeneous personalities, learning styles, or self-efficacy domains (Hollas, 2007; Santangelo & Tomlinson, 2009). When grouping, it is important students understand classroom procedures, especially when the group includes students with different personality types (Hollas, 2007). Teachers should determine when it is critical to work in pairs or small groups based on the content and readiness of the students involved (Sousa & Tomlinson, 2018).

Recommendations for Future Research

Based on the results of this study, studies could be conducted using similar needs assessment surveys related to education with more independent variables to analyze differences in gender, age group, and academic achievement. Also, students' perceptions of differentiated instruction could enable researchers to look at this topic from another angle. The data from these studies could help to build a more advanced model of differentiated instruction to target individual needs in a time when learner diversity is at its highest level. Most studies relating to personality type, learning style preferences, and self-efficacy have been conducted with kindergarten students or university students, and many have been conducted outside the United States.

One recommendation for future research is to conduct needs assessment surveys with a similar population to see if there are significant differences in gender relating to personality type, learning style preference, and self-efficacy domain. According to Sousa and Tomlinson (2018), girls tend to be more sensitive, build relationships with their teachers, do their homework, enjoy cooperative learning activities, and talk about their feelings. It would be interesting to see if girls have a greater preference for auditory or visual learning styles. On the other hand, boys tend to be more competitive, able to learn in stressful contexts, and can be better at spatial and numerical tasks (Sousa & Tomlinson, 2018). It would be interesting to see if boys have a preference for kinesthetic learning tasks.

A second recommendation for future research is to conduct needs assessment surveys with fifth- and 12th-grade students. Personality traits remain stable over time (Khatibi & Khormaei, 2016), whereas learning styles tend to change (Bernard et al.,

2017; Leasa et al., 2017) and could even be generational (Chen et al., 2018). There seems to be a common theme in recent literature that confirms classrooms across America are moving from a teacher-centered to a student-centered environment. It would be interesting to follow the same students throughout their K-12 journey.

A third recommendation for future research is to investigate how these variables relate to achievement by examining GPAs, ACT scores, state test scores, or grades during the transitional freshman year. There are several studies linking personality types with achievement. Notably, conscientiousness is cited as having a high correlation with academic achievement (Berlin et al., 2016; Hakimi et al., 2011; Köseoğlu, 2016; Marcela, 2015; Qaisy & Thawabieh, 2016), as are agreeableness (Vedel, 2015) and openness (Berlin et al., 2016; Marcela, 2015; Vedel, 2015). According to Ansong et al. (2016) and Brown et al. (2016), the self-efficacy domain with the highest correlation to academic achievement is academic. As far as learning style preference and academic achievement, studies indicate there is no significant relationship (Awang et al., 2017). Very few, if any, of these studies have been conducted with ninth-grade students in America.

The fourth recommendation for future research is to conduct a qualitative study on student perceptions of personality type, learning style preference, and self-efficacy. Ninth-grade students could answer questions about differentiated instruction and elaborate on the pros and cons. It would be interesting to see if the needs assessment survey responses matched the perceptions of students about what learning characteristics they think they have. Few studies have been conducted to gather evidence on whether or not students prefer differentiation strategies, but there is some research that indicates students prefer alternate pathways of learning to meet their needs (Ismajli & Imami-

Morina, 2018). Students who have experience with differentiated instruction have reported an increase in motivation as well as a better understanding of the content, which is the purpose behind public education (Marghitan et al., 2016).

Summary

This study was unique in that a societal problem was addressed—a rapidly increasing mixed-ability classroom population—by shedding light on a pedagogical practice that has evolved over the last century. When teachers differentiate instruction based on needs assessments and learner profiles, teacher-centered learning transforms into student-centered learning. Teachers can build better relationships with their pupils, help them set goals, and cater to their learning style needs to ultimately boost self-efficacy. Students become aware of their strengths and weaknesses, advocate for their own learning, and become more engaged and motivated to reach academic goals and attain lifetime success.

The three variables of this study were personality type, learning style preference, and self-efficacy. These traits are common among needs assessments for adolescents. The Big Five Personality Survey was used in this study; the survey is very popular in research, and the survey itself consisted of 50 Likert-type items that were easy to read and interpret. Self-awareness of personality type can contribute to a better understanding of self and others, lending to more meaningful relationships. The Thinking and Learning Styles Survey was also used in this study. The 24-item Likert-type survey was used to indicate what learning style preference the respondents identified with, although learning styles can change over time.

Understanding one's learning style preference can increase student autonomy and allow them to expand on their strongest modality while improving modalities in which they are weak. For self-efficacy, the SEQ-C survey was used because it was readily available and easy to read. The survey consisted of 24 items using a Likert-type scale. The scores were indicative of which self-efficacy domain was the strongest per respondent: academic, social, or emotional. An increased awareness of self-efficacy could motivate some adolescents to seek guidance and support using strategies that increase self-confidence. Some respondents indicated multiple strengths, as evidenced by the responses on the three surveys.

The first research question was developed to determine the difference between personality type and learning style preference. In this study, there was an overwhelmingly large number of respondents with the personality type of agreeableness and the learning style preference kinesthetic. This result is characteristic of ninth-grade students as they try to fit in during this pivotal year. Five parings of personality type and learning style preference resulted in fewer than four responses from a sample size of 106 students.

The second research question was developed to determine the difference between self-efficacy domain and learning style preference, and findings resulted in a significant difference with both the academic and social self-efficacy domains when paired with the kinesthetic learning style preference. At a time when students want to fit in, it was not surprising the social self-efficacy domain had the highest number of respondents. The two lowest parings for this research question consisted of the emotional self-efficacy domain, which usually does not develop until later in life.

The third research question was developed to determine the difference between personality type and self-efficacy domain. In this study, there was a large number of respondents with the personality type of agreeableness and the self-efficacy domains of academic and social. These results are suggestive that ninth-grade students are social, cooperative, and engaged. Each cell in the contingency table contained a value of five or greater, indicating all students have different needs, further promoting the pedagogy of differentiated instruction.

With the use of needs assessment surveys and differentiated instruction strategies, teachers can be flexible with content, process, product, and flexible grouping. Using tiered lesson plans, scaffolding, choice boards, and rubrics, teachers can give students more choice on how to learn content and show mastery with authentic, relevant product and assessment options. Based on the findings of this study, choice boards were created based upon the three research questions, literature review, and findings to help teachers implement differentiated instruction with fidelity. With learner diversity on the rise, each student deserves to be an individual, feel safe in an inclusive environment, and be educated with resources and opportunities to champion success.

Chapter One of this study included the background of the study and the statement of the problem. The purpose of the study and the research questions were identified. The significance of the study and the definitions of key terms were revealed. Chapter One also included the delimitations, limitations, and assumptions.

The review of literature was provided in Chapter Two. The main topics included a synopsis of ninth grade as a transitional year for students, aspects of differentiated instruction, and a review of the three variables: personality type, learning style

preference, and self-efficacy. Subcategories of differentiated instruction included how neuroscience supports differentiated instruction, differentiated instruction practices today, barriers and strategies with implementation, and school norms and culture associated with differentiated instruction. For each variable, a summary was provided along with an explanation of how the variables can be used to differentiate instruction, as well as the relationship among the variables for each research question.

Chapter Three included a restatement of the purpose and problem of this study. The research questions were stated followed by the rationale for the investigation. Then, the population and sample, instrumentation, reliability, validity, data collection, and data analysis were addressed. Finally, ethical considerations were stated.

In Chapter Four, detailed information regarding the participants was stated. Descriptions of the variables and surveys were provided. A definition of the chi-square goodness-of-fit test was provided followed by the chi-square analysis to determine the differences between the variables for each research question.

Finally, Chapter Five included the findings from the research. The conclusions were described. The implications for practice and the recommendations for future research were identified.

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Appendix A

The Big Five Personality Survey

Instructions: In the table below, for each statement 1-50 mark how much you agree with on the scale 1-5, where l=disagree, 2=slightly disagree, 3=neutral, 4=slightly agree, and 5=agree, in the box to the left of it.

Rating	I…	Rating	I…
	1. Am the life of the party.		26. Have little to say.
	2. Feel little concern for others.		27. Have a soft heart.
	3. Am always prepared.		28. Often forget to put things back in their proper place.
	4. Get stressed out easily.		29. Get upset easily.
	5. Have a rich vocabulary.		30. Do not have a good imagination.
	6. Don't talk a lot.		31. Talk to a lot of different people at parties.
	7. Am interested in people.		32. Am not really interested in others.
	8. Leave my belongings around.		33. Like order.
	9. Am relaxed most of the time.		34. Change my mood a lot.
	10. Have difficulty understanding abstract ideas.		35. Am quick to understand things.
	11. Feel comfortable around people.		36. Don't like to draw attention to myself.
	12. Insult people.		37. Take time out for others.
	13. Pay attention to details.		38. Shirk my duties.
	14. Worry about things.		39. Have frequent mood swings.
	15. Have a vivid imagination.		40. Use difficult words.
	16. Keep in the background.		41. Don't mind being the center of attention.
	17. Sympathize with others' feelings.		42. Feel others' emotions.
	18. Make a mess of things.		43. Follow a schedule.
	19. Seldom feel blue.		44. Get irritated easily.
	20. Am not interested in abstract ideas.		45. Spend time reflecting on things.
	21. Start conversations.		46. Am quiet around strangers.
	22. Am not interested in other people's problems.		47. Make people feel at ease.
	23. Get chores done right away.		48. Am exacting in my work.
	24. Am easily disturbed.		49. Often feel blue.

	25. Have excellent ideas.		50. Am full of ideas.

E = 20 + (1)__ -(6)__ +(11)__ -(16)__ +(21)__ -(26)__ +(31)__ -(36)__ +(41)___ -(46)__ = _____

A = 14 − (2)__ +(7)__ -(12)__ +(17)__ -(22)__ + (27)__ -(32)__ +(37)__ +(42)__ +(47)__ = _____

C = 14+ (3)__ -(8)__ +(13)__ -(18)__ +(23)__ -(28)__ +(33)__ -(38)__ +(43)__ +(48)__ = _____

N = 38 − (4)__ +(9)__ -(14)__ +(19)__ -(24)__ -(29)__ -(34)__ -(39)__ -(44)__ -(49)__ = _____

O = 8 + (5)__ -(10)__ +(15)__ -(20)__ +(25)__ -(30)__ +(35)__ +(40)__ +(45)__ +(50)__ = _____

The scores you calculate should be between zero and 40. Below is a description of each trait:

Extroversion (E) is the personality trait of seeking fulfillment from sources outside the self or in community. High scorers tend to be very social while low scorers prefer to work on their projects alone.

Agreeableness (A) reflects how much individuals adjust their behavior to suit others. High scorers are typically polite and like people. Low scorers tend to 'tell it like it is.'

Conscientiousness (C) is the personality trait of being honest and hardworking. High scorers tend to follow rules and prefer clean homes. Low scorers may be messy and cheat others.

Neuroticism (N) is the personality trait of being emotional.

Openness to Experience (O) is the personality trait of seeking new experience and intellectual pursuits. High scorers may daydream a lot. Low scorers may be very down to earth.

Appendix B

Self-Efficacy Survey for Children (SEQ-C)

	1 Not at all	2	3	4	5 Very well
1. How well can you get teachers to help you when you get stuck on schoolwork?	O	O	O	O	O
2. How well can you express your opinions when other classmates disagree with you?	O	O	O	O	O
3. How well do you succeed in cheering yourself up when an unpleasant event has happened?	O	O	O	O	O
4. How well can you study when there are other interesting things to do?	O	O	O	O	O
5. How well do you succeed in becoming calm again when you are very scared?	O	O	O	O	O
6. How well can you become friends with other children?	O	O	O	O	O
7. How well can you study a chapter for a test?	O	O	O	O	O
8. How well can you have a chat with an unfamiliar person?	O	O	O	O	O
9. How well can you prevent to become nervous?	O	O	O	O	O
10. How well do you succeed in finishing all your homework every day?	O	O	O	O	O
11. How well can you work in harmony with your classmates?	O	O	O	O	O
12. How well can you control your feelings?	O	O	O	O	O
13. How well can you pay attention during every class?	O	O	O	O	O
14. How well can you tell other children that they are doing something that you don't like?	O	O	O	O	O
15. How well can you give yourself a pep-talk when you feel low?	O	O	O	O	O
16. How well do you succeed in understanding all subjects in school?	O	O	O	O	O
17. How well can you tell a funny event to a group of children?	O	O	O	O	O
18. How well can you tell a friend that you don't feel well?	O	O	O	O	O
19. How well do you succeed in satisfying your parents with your schoolwork?	O	O	O	O	O
20. How well do you succeed in staying friends with other children?	O	O	O	O	O

21. How well do you succeed in suppressing unpleasant thoughts?	○	○	○	○	○
22. How well do you succeed in passing a test?	○	○	○	○	○
23. How well do you succeed in preventing quarrels with other children?	○	○	○	○	○
24. How well do you succeed in not worrying about things that might happen?	○	○	○	○	○

Scoring

A total self-efficacy score can be obtained by summing across all items.
Items 1, 4, 7, 10, 13, 16, 19, and 22 = Academic self-efficacy
Items 2, 6, 8, 11, 14, 17, 20, and 23 = Social self-efficacy
Items 3, 5, 9, 12, 15, 18, 21, and 24 = Emotional self-efficacy

Key references

Muris, P. (2001). A brief questionnaire for measuring self-efficacy in youths. *Journal of Psychopathology and Behavioral Assessment*, *23*, 145-149.

Muris, P. (2002). Relationships between self-efficacy and symptoms of anxiety disorders and depression in a normal adolescent sample. *Personality and Individual Differences*, *32*, 337-348.

Note

Three items of this questionnaire were taken from Bandura et al. (1999). See: Bandura, A., Pastorelli, C., Barbaranelli, C., & Caprara, G.V. (1999). Self-efficacy pathways to childhood depression. *Journal of Personality and Social Psychology*, *76*, 258-269.

Appendix C

Thinking and Learning Preferences Survey

To access inventory: http://differentiatiedinstruction.pbworks.com/f/Thinking-Learning+Styles+Inventory+(Level+II).pdf

Appendix D

Permission to use the IPIP for the Big Five Personality Survey

Obtaining Permission

Because the IPIP has been placed in the public domain, permission has already been automatically granted for any person to use IPIP items, scales, and inventories for any purpose, commercial or non-commercial..

It is not necessary to contact the IPIP site author (Lew Goldberg) or the IPIP Consultant (John A. Johnson) for permission to use IPIP materials. Requests for permission to use IPIP materials will be answered by sending the requester a link to this page.

Appendix E

Permission to use the SEQ-C

From: Muris, Peter (PSYCHOLOGY) <peter.muris@maastrichtuniversity.nl>
Sent: Tuesday, November 13, 2018 1:26 AM
To: MOCK, KATIE (Student) <KM746@lindenwood0.onmicrosoft.com>
Subject: RE: Permission to use the SEQ-C

The scale is free to use!
All the best Peter

Appendix F

Permission to Use the Thinking and Learning Preferences Survey

free spirit
PUBLISHING®

Meeting kids' social,
emotional & educational
needs since 1983

217 Fifth Avenue North, Suite 200
Minneapolis, MN 55401-1299
phone 612.338.2068 fax 612.337.5050
help4kids@freespirit.com
www.freespirit.com

PERMISSION AGREEMENT

DATE: March 27, 2019

TO: Katie Mock, EdD student
          209 S. Kingshighway
          St. Charles, MO 63301
          636-949-2000
          Km746@lindenwood.edu

FREE SPIRIT PUBLICATION
Title: *RTI Success: Proven Tools and Strategies for Schools and Classrooms* (Revised &
                  Updated Edition)
Author(s):   Elizabeth Whitten, Ph.D., Kelli J. Esteves, Ed.D., Alice Woodrow, Ed.D.
Selection: pg. 70-74: Thinking and Learning Preferences Inventory (Level I), Thinking and
                  Learning Preferences Inventory Scoring Guide (Level I), Thinking and Learning
                  Preferences Inventory (Level II), Thinking and Learning Preferences Inventory
                  Scoring Guide (Level II)

RIGHTS NEGOTIATED
Date requested: December 10, 2018
For use: The above selections will be included in the student's dissertation and survey.

Author(s):   Katie Mock
Publisher: Doctoral dissertation
Publication date:
Retail price: $0.00
Print run: N/A
Language: English
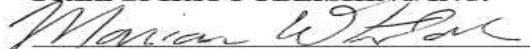Territory: USA
Terms:

RIGHTS GRANTED
Free Spirit Publishing grants you the nonexclusive one-time reproduction rights of the Selection for
the purpose of conducting an anonymous survey for your doctoral dissertation according to the terms
above upon your agreement with the following:

1. To properly credit the sources for all Selections. The credit should read:

    Excerpted from *RTI Success: Proven Tools and Strategies for Schools and Classrooms* by
    Elizabeth Whitten, Ph.D., Kelli J. Esteves, Ed.D., Alice Woodrow, Ed.D., copyright © 2019.

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    www.freespirit.com. All rights reserved.

FREE SPIRIT PUBLISHING INC.

Marian Whitaker (signature)   3/27/19
Marian Whitaker   Date

Appendix G

Superintendent Permission Letter Template
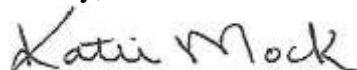
Date: _____

To: Superintendent

Dear Superintendent:

I am writing to request permission to conduct research in the _____ School District. I am currently pursuing my doctorate through Lindenwood University and am in the process of writing my dissertation. The study is entitled *Personality Type, Self-Efficacy, and Learning Style Preference: A Quantitative Study of Ninth-Grade Students in Missouri.*

I am asking permission to work with the High School Counselor or Assistant Principal to have all ninth-grade students complete three online surveys using one link sent to them in an email. The surveys include the Big Five Personality Survey, the Self-Efficacy Survey (SEQ-C), and the Thinking Styles and Learning Preferences Survey. Permission for each student to participate would need to be granted using the Adult Consent on Behalf of a Minor form and the Student Assent form, both provided by Lindenwood University.

If you agree, please sign below, scan this page, and email to Katie Mock at ████████. Your approval to conduct this study will be greatly appreciated. I would be happy to answer any questions or concerns you may have regarding this study.

Sincerely,

Katie Mock

Katie Mock, Doctoral Student at Lindenwood University

Approved by:

_____

Print name and title here

_____   _____

Signature   Date

Appendix H

Introductory Phone Call Script

Re: Counselors of Selected School Districts

Hello. My name is Katie Mock, and I am a Doctoral Candidate at Lindenwood University. I am conducting a study titled *Personality Type, Self-Efficacy, and Learning Style Preference: A Quantitative Study of Ninth-Grade Students in Missouri*. Since the superintendent of your district has already approved participation in the study, I would like to ask for your cooperation in gathering data. In this study, ninth-grade students will be asked to complete three surveys: personality type, self-efficacy, and learning style preference using one mobile or desktop link. The three surveys together will take from 20 minutes to 45 minutes to complete. Participation in the survey is voluntary; student assent forms are required to be signed by the student, and parent consent forms are required to be signed by the parent or guardian.

There are no risks from participating in this study, and I will not collect any information that may identify participants. Your role will be as follows: 1) distribute the parent consent and student assent forms to the students, which I will supply, 2) collect the consent and assent forms after they have been signed, 3) forward the survey link (from Qualtrics) to ninth-grade students who returned the signed forms, and 4) read the supplied prompt.

All questions can be directed to me, Katie Mock, at ▮▮▮▮▮▮▮▮ or ▮▮▮▮▮▮▮▮▮▮. I sincerely look forward to working with you and thank you again for your cooperation.

Prompt: *Hello students. I am here today to proctor a survey you are asked to complete on behalf of a graduate student attending Lindenwood University. Please open the email with the link from Qualtrics. Your identity cannot be linked to your responses, so please be honest as you complete all three surveys. Thank you for your participation. You may open the link.*

Appendix I

IRB Approval Letter

Nov 11, 2019 5:33 PM CST

RE: IRB-20-59: Initial - Personality Type, Self-efficacy, and Learning Style Preference: A Quantitative Study of Ninth-Grade Students in Missouri

Dear Katie Mock,

The study, Personality Type, Self-efficacy, and Learning Style Preference: A Quantitative Study of Ninth-Grade Students in Missouri, has been Approved as Exempt. Category: Category 1. Research, conducted in established or commonly accepted educational settings, that specifically involves normal educational practices that are not likely to adversely impact students' opportunity to learn required educational content or the assessment of educators who provide instruction. This includes most research on regular and special education instructional strategies, and research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.

The submission was approved on November 11, 2019.

Here are the findings: Regulatory Determinations

This study has been determined to be minimal risk because the research is not obtaining data considered sensitive information or performing interventions posing harm greater than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests.

IRB Discussion

This protocol requires assistance from staff at each participating site. The IRB has reviewed this participation and affirmed that these individuals will not be performing tasks which would make them engaged in this research. For this reason, the IRB has waived requirements for CITI training for each of these individuals.

Sincerely, Lindenwood University (lindenwood) Institutional Review Board

Appendix J

IRB Approval Letter for Resubmission

Nov 11, 2019 5:33 PM CST

RE:
IRB-20-59: Initial - Personality Type, Self-efficacy, and Learning Style Preference: A Quantitative Study of Ninth-Grade Students in Missouri

Dear Katie Mock,

The study, Personality Type, Self-efficacy, and Learning Style Preference: A Quantitative Study of Ninth-Grade Students in Missouri, has been Approved as Exempt.

Category: Category 1. Research, conducted in established or commonly accepted educational settings, that specifically involves normal educational practices that are not likely to adversely impact students' opportunity to learn required educational content or the assessment of educators who provide instruction. This includes most research on regular and special education instructional strategies, and research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods.

The submission was approved on November 11, 2019.

Here are the findings: **Regulatory Determinations**

- This study has been determined to be minimal risk because the research is not obtaining data considered sensitive information or performing interventions posing harm greater than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests.

IRB Discussion

- This protocol requires assistance from staff at each participating site. The IRB has reviewed this participation and affirmed that these individuals will not be performing tasks which would make them engaged in this research. For this reason, the IRB has waived requirements for CITI training for each of these individuals.

Sincerely,
Lindenwood University (lindenwood) Institutional Review Board

Appendix K

Letter of Participation to Parents

Date: _____

Dear Parent or Guardian of Ninth-Grade Student,

My name is Katie Mock. I am a doctoral student at Lindenwood University, and I am conducting a research study on Differentiated Instruction. The title of the study is *Personality Type, Self-Efficacy, and Learning Style Preference: A Quantitative Study of Ninth-Grade Students in Missouri*.

I would like to invite you to participate in this study. I have attached the Research Information Sheet. If you choose to allow your son or daughter to participate, please sign and return the consent form that was supplied by the school counselor.

Please contact me at ███████████████ with any questions you might have.

Thank you,

Katie Mock

Lindenwood University
Doctoral Student

Appendix L

Letter of Participation to Students

Date: _____

Dear Ninth-Grade Student,

My name is Katie Mock. I am a doctoral student at Lindenwood University, and I am conducting a research study on Differentiated Instruction. The title of the study is *Personality Type, Self-Efficacy, and Learning Style Preference: A Quantitative Study of Ninth-Grade Students in Missouri*.

I would like to invite you to participate in this study. I have attached the Research Information Sheet. If you choose to participate, please sign and return the assent form and complete the survey online when asked to do so by your school counselor.

Please contact me at ███████████████ with any questions you might have.

Thank you,

Katie Mock

Lindenwood University
Doctoral Student

LINDENWOOD

Research Study Assent Form

What is research?

We are going to do a research study. A research study is when a researcher or doctor collects information to learn more about something. During this research study, we are going to learn more about differentiating instruction according to student personality type, self-efficacy, and learning style preference. After we tell you more about this study, we would like to ask you about being part of it.

We also will be asking about 280 other people to be part of this study.

What will you ask me to do?

If you choose to be part of this study, you will be sent an email containing one link to three surveys. You will anonymously answer questions about your personality type, self-efficacy, and learning style preference.

This study is going to last approximately 30-45 minutes, and then it will be over.

Will I be harmed during this study?

- There are no anticipated risks associated with this research. There is a slight possibility that information during this research study may be captured and used by others not associated with this study.

Your responses will be kept confidential and will be destroyed after three years from the completion of the study. Student identities will not be revealed in any publication or presentation which could result from the study.

Will I benefit from being in this study?

You will not get anything special if you decide to be part of this study. We hope what we learn will help other children.

Do I have to be in this research?

No, you do not. If you do not want to be in this research study, just tell us. You can also tell us later if you do not want to be part of it anymore. No one will be mad at you, and you can talk to us at any time if you are nervous.

What if I have questions?

You can ask us questions right now about the research study. You can ask questions later if you want to. You can also talk to someone else about the study if you want to, and you can change your mind at any time. Being in this research study is up to you.

If you want to be in this research study, just tell us. Or, you can sign your name in the blank below. We will give you a copy of this form to keep.

_____   _____

Minor Participant's Signature   **Date**

_____

Minor Participant's Printed Name

_____   _____

Signature of Principal Investigator or Designee   **Date**

_____

Investigator or Designee Printed Name

Appendix N

LINDENWOOD

Research Study Consent Form

Personality Type, Self-Efficacy, and Learning Style Preference: A Quantitative Study of Ninth-Grade Students in Missouri

Note: "You" in this form refers to the minor participant. If an activity or requirement refers to the parent or guardian consenting on behalf of the minor, this will be clearly indicated.

Before reading this consent form, please know:

- Your decision to participate is your choice
- You will have time to think about the study
- You will be able to withdraw from this study at any time
- You are free to ask questions about the study at any time

After reading this consent form, we hope that you will know:

- Why we are conducting this study
- What you will be required to do
- What are the possible risks and benefits of the study
- What alternatives are available, if the study involves treatment or therapy
- What to do if you have questions or concerns during the study

---

Basic information about this study:
- We are interested in learning about differentiating instruction for students based on student personality type, self-efficacy, and learning style preference.
- You will be asked to respond to statements in three different surveys using one link sent to you in an email.
- Risks of participation include the possibility that information during this research study may be captured and used by others not associated with this study.

LINDENWOOD

Research Study Consent Form

Personality Type, Self-Efficacy, and Learning Style Preference: A Quantitative Study of Ninth-Grade Students in Missouri

You are asked to participate in a research study being conducted by Mrs. Katie Mock under the guidance of Dr. Shelly Fransen at Lindenwood University. Being in a research study is voluntary, and you are free to stop at any time. Before you choose to participate, you are free to discuss this research study with family, friends, or a physician. Do not feel like you must join this study until all of your questions or concerns are answered. If you decide to participate, you will be asked to sign this form.

Why is this research being conducted?
We are conducting this study to learn more about differentiating instruction based on student personality type, self-efficacy, and learning style preference. We will be asking about 280 other people to answer these questions.

What am I being asked to do?
If you choose to be part of this study, you will be sent an email containing one link to three surveys. You will anonymously answer questions about your personality type, self-efficacy, and learning style preference.

How long will I be in this study?

This study is going to last approximately 30-45 minutes, and then it will be over.

What are the risks of this study?

- Privacy and Confidentiality:

  We will be collecting data that could identify you, but each survey response will receive a code so that we will not know who answered each survey. The code connecting you and your data will be destroyed as soon as possible.

  We are collecting data that could identify you, such as electronic mail addresses. Every effort will be made to keep your information secure. Only members of the research team will be able to see any data that may identify you.

We will be collecting data from you using the internet. We will take every reasonable effort to maintain security. Three surveys will be sent to you in an email with the aid of a data software program titled Qualtrics. Qualtrics allows the researcher to gather and analyze the data without collecting any demographics. It is always possible that information during this research study may be captured and used by others not associated with this study.

What are the benefits of this study?

You will receive no direct benefits for completing this survey. We hope what we learn may benefit other people in the future.

What if I do not choose to participate in this research?

It is always your choice to participate in this study. You may withdraw at any time. You may choose not to answer any questions or perform tasks that make you uncomfortable. If you decide to withdraw, you will not receive any penalty or loss of benefits. If you would like to withdraw from a study, please use the contact information found at the end of this form.

What if new information becomes available about the study?

During the course of this study, we may find information that could be important to you and your decision to participate in this research. We will notify you as soon as possible if such information becomes available.

How will you keep my information private?

We will do everything we can to protect your privacy. We do not intend to include information that could identify you in any publication or presentation. Any information we collect will be stored by the researcher in a secure location. The only people who will be able to see your data are members of the research team, qualified staff of Lindenwood University, and representatives of state or federal agencies.

How can I withdraw from this study?

Notify the research team immediately if you would like to withdraw from this research study.

Who can I contact with questions or concerns?

If you have any questions about your rights as a participant in this research or concerns about the study, or if you feel under any pressure to enroll or to

continue to participate in this study, you may contact the Lindenwood University Institutional Review Board Director, Michael Leary, at (636) 949-4730 or mleary@lindenwood.edu. You can contact the researcher, Katie Mock, directly at █████████ or ████████████. You may also contact Dr. Shelly Fransen at ████████████.

I have read this consent form and have been given the opportunity to ask questions. I will also be given a copy of this consent form for my records. I consent to my participation in the research described above.

_____   _____

Parent or Legally Authorized Representative's Signature   **Date**

_____

Parent or Legally Authorized Representative's Printed Name

_____   _____

Signature of Principal Investigator or Designee   **Date**

_____

Investigator or Designee Printed Name

Vita

Katie Mock has been a public-school science teacher for 21 years. Her journey began at a rural school in Missouri, where she taught several different science classes for grades 7-12. During the following four years, she focused on teaching Physical Science and Chemistry in a different school district that was larger and more diverse. During this time, she earned her master's degree in secondary administration.

Upon moving to Oklahoma, she began teaching seventh-grade science at a well-respected middle school. This role provided her opportunities to be a chairperson for the district professional learning committee and implement an all-school enrichment program focused on differentiated instruction. It was during this time she received the District Teacher of the Year award and was able to compete for Oklahoma State Teacher of the Year.

After moving back to Missouri, she continued her teaching career at a high school where Chemistry became her passion. She chaired the PBIS committee, implemented a school-wide incentive program, and became an active member of the Missouri State Teachers Association, the Community Teachers Association, as well as the local FFA chapter. Currently, she is a science teacher at Webb City High School in Webb City, Missouri. She teaches Biology, Chemistry, and Anatomy and Physiology, and is still an active member of the PBIS team as well as the Missouri State Teachers Association.