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English Language Learners: A Comparison Of The Effects Of Wida Proficiency On Online, Blended And Traditional Learning

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ENGLISH LANGUAGE LEARNERS: A COMPARISON OF THE EFFECTS OF WIDA

PROFICIENCY ON ONLINE, BLENDED AND TRADITIONAL LEARNING

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A dissertation

Presented to

The College of Graduate and Professional Studies

Department of Educational Leadership

Indiana State University

Terre Haute, Indiana

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In Partial Fulfillment

of the Requirements for the Degree

Doctor of Philosophy

_____

by

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December 2021

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Keywords: English Learner, online, blended, traditional, SAT, WIDA

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ABSTRACT

This quantitative study sought to learn if instructional mode (online, blended, traditional) had an impact on evidence-based reading and writing SAT scores for English Language Learners, as well as if WIDA (World-Class Instructional Design and Assessment) is a predictor of the evidence-based reading and writing SAT scores for ELL students. This study also compared ELLs against non-ELLs on the evidence-based reading and writing portion of the SAT and compared male and female ELLs. Data were collected for all ELLs that were juniors during the 2017–18 school year from the state of Michigan. Data were also collected from Michigan public schools that identified as blended or online learning. The data were received from the Michigan Education Research Institute. This research provides new science for ELLs that WIDA is a predictor for evidence-based reading and writing SAT scores, and no significance was found on mode of instruction for ELLs. It was determined that females test higher than males on the evidence-based reading and writing portion of the SAT. The implications of this new science are valuable to leaders, teachers, and families of ELLs.

ACKNOWLEDGEMENTS

I would like to thank my dissertation chair, Ryan Donlan, for his guidance and encouragement to dive deeper into percolation and persevere through. His words are always motivating and full of sage advice. The members of my committee were essential to the successful completion of my research, providing critical and insightful feedback. Steve Gruenert guided my strategic thought which led to the theoretical framework in this research. Sunil Joy, Christy Coleman, and Eric Hampton helped support and guide me through the statistical process. Nora Beerline supported and encouraged me throughout with her never ending guidance on copy editing. To the Indiana State University REDS Cohort and smaller "Zoom crew" that spanned several states and time zones: I treasure our network and am thankful for your support through this journey. A special thank you to my husband Todd, and children Dawson and Sela, for supporting every dream, goal, and crazy idea of an adventure that I have. This research project would not have been possible without your love and support. Thank you to my mom and dad who fostered a love of travel and hard work, and always believed in my endeavors. I would also like to thank my many friends who supported me through the journey, if while running, walking or at the beach. Finally, to my Grandma Dawson, I wish you were here to witness this. Your value of education above all else I will always keep in my heart, and hope to share with the world.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1

INTRODUCTION

The appearance of education has been transforming globally over the past 20 years.

Technology and the internet have been the driving force behind this internationally changing

landscape of teaching and learning. The internet has brought knowledge to the fingertips of every

student and educator. The use of technology in the classroom has provided new opportunities for

teachers in student engagement and supporting the learning process. It has increased student

collaboration and provided opportunities to move away from a traditional classroom. Blended

classes and online classes are now options for students to continue their education. Blended

classes take place in the classroom and online, and online classes take place 100 percent online.

The access to the internet has continued to grow over the last 20 years, and now the internet is

universally available in the United States (Institute of Education Sciences, n.d.). The access for

students to technology and the internet has also allowed for the integration of blended learning

and online classes in the education system.

Internet accessibility and technology have improved the opportunity for students of all

backgrounds, economic levels, and language barriers to access learning. Despite the broad

research on traditional, blended, and online learning, little information exists about the impact of

technology and online learning for English language learners. This study concentrated primarily

on high school English language learner (ELL) students and how technology and the internet

(online, blended learning) impact their success on the evidence-based reading and writing section of the Scholastic Aptitude Test (SAT) when compared with their World-Class Instructional Design and Assessment (WIDA) proficiency. This was a quantitative study that would enable educators working with ELL populations to know what instructional types of support ELLs based on WIDA proficiency, or if supports are needed in a specific learning platform.

Background of the Problem

Over the last 30 years, the world has seen the technology boom, from cell phones to every student having their own technology device in the classroom. The internet is universally accessible by everyone in the United States. According to the Internet World Stats (2020), 89.4 percent of the population in the United States is accessing the Internet. In 2017, 88.1 percent of the population in North America was accessing the Internet (Internet World Stats, 2020). The internet is continuing to grow in accessibility, and has become an essential part of daily life, from business, communication, and education.

The increase in immigration of ELLs over the past 30 years has changed the way learning occurs in the traditional brick and mortar classroom. According to the U.S. Department of Education,

A [Limited English Proficient] student, or English language learner (ELL) is defined as an individual who was not born in the United States or whose native language is a language other than English; or who comes from an environment where a language other than English is dominant; or who is an American Indian or Alaska Native and who comes from an environment where a language other than English has had a significant impact on his or her level of English language proficiency. States utilize the results of a "screener"/placement English language proficiency assessment to identify a child as

LEP/ELL and to place him/her in a language instruction educational program. (Migration

Policy Institute, n.d., para. 3)

The United States percentage of limited English proficient persons in 1990 was 6.1% (Sugarman

& Geary, 2018). In 2017, the percentage of limited English proficient persons increased to 8.5%

in the United States. In Michigan, the percentage of limited English proficient persons was 2.1%

in 1990, and 3.4% in 2017. The number of ELLs in grades K–2 during the 2015–16 school year

in the United States had increased to over 4.8 million; this represents 10% of the enrollment in

public schools. In the state of Michigan, the ELL student population in grades K–12 was 5.5%.

The ELL population is steadily increasing and requires all educators to take notice and make

appropriate accommodations (Center for Immigration Studies, n.d.). To make accommodations,

educators need to be trained in how best to serve ELL students.

Different framework theories were reviewed in this study to learn how best to serve ELL

students in this digital age. The most relevant theories are Mayer's cognitive theory of

multimedia learning, Kop and Hill's connectivism theory, Krashen's second language acquisition

theory, and the shelter instruction observation protocol (SIOP) model. The cognitive theory of

multimedia learning is important in understanding how the use of a digital platform increases

student educational outcomes. This theory is developed from cognitive theory and dual-coding

theory. The foundation of the multimedia learning research hypothesizes that multimedia

instructional information created with words and pictures would lead to deeper content

understanding than instructional information that are created with words only (Mayer, 2014).

The use of technology incorporates the dual-coding theory of using both audio and visual in the

learning process and allows the student to acquire content knowledge efficiently. This makes the

cognitive theory of multimedia learning an important theory to explain the value of online, blended, and distance learning.

Where the cognitive theory of multimedia learning helps to understand learning with technology, connectivism helps to understand learning about one's environment and connecting with it through technology. According to connectivism theory, "the starting point for learning occurs when knowledge is actuated through the process of a learner connecting to and feeding information into a learning community […] The Connectivist model is learning for the current technology age we are living in" (Kop & Hill, 2008, p. 2). Connectivists disagree with a teacher-centered classroom but believe in student-centered learning. This theory also supports the movement towards online, blended, and distance learning.

While connectivism helps in understanding the importance of connecting to one's environment, the second language acquisition theory helps in understanding how a person acquires a second language. The second language acquisition theory affirms two systems are used in language acquisition: the subconscious system and the learned system. The subconscious system is a process whereby "language learners are not usually aware of the fact they are acquiring language" (Krashen, 1982, p. 8); it requires meaningful interaction in the target language. The learned system is the formal process of education through instruction if that is traditional, blended or online. This process of the learned system is conscious learning. This theory supports the learning process of ELLs, which is a focal point of this study.

According to the second language acquisition theory, if the content is comprehensible, this increases student learning. To that end, the SIOP model was developed to help the learning process and content delivery be more understandable for ELL students. The implementation of

the SIOP model is important in working with ELLs and the acquisition of a second language

(Kareva & Echevarria, 2013).

<h2 align="center">Statement of the Problem</h2>

Education changed remarkably after March of 2020. The onset of COVID-19 sent

schools across the world into remote education (Li & Lalani, 2020). This, combined with the

increase in immigration of English language learners, the advancement of the digital world, and

internet accessibility have changed the way education occurs (Internet World Stats, 2020). When

schools were sent into remote learning, some schools were more prepared than others. With

advancement in technology over the last 30 years, education remained relatively unchanged until

the onset of COVID-19. When remote learning occurred across the United States in March of

2020, some schools were prepared to send devices home with students, some locations did not

have internet accessibility even if they had devices, and other schools sent home worksheets.

There was a large disparity in quality education for all students. Schools that were able to send

devices home with students and went online with learning were forced to do so with no training

on theories of best practices for online learning (Li & Lalani, 2020). Teachers were delivering

content to students in the same format even though students learn in different ways. One group

of students that need differing supports are ELLs. As educators continue in a changing

educational environment with a technology-based format, it is important to know how best to

support the ELL population.

ELLs have significant achievement gaps compared to native English speakers. Teenage

ELLs have a larger workload because they are learning English simultaneously as learning

content for core classes, "with resulting challenges in passing tests and completing graduation

requirements" (Migration Policy Institute, n.d.-b, para. 1). "ELLs are the fastest growing student

population in public schools and are twice as likely to drop out of high school, and have an even lower chance of completing a postsecondary education" (Parsi, 2016, para.1).

The ELL population is also steadily increasing, and "all 50 state constitutions require the establishment of a system of free, public schools to serve children in primary and secondary grades" (Sugarman, 2019, para. 1). The law states "English Learners must have meaningful access to education" (Sugarman, 2019, para. 1). To make accommodations, educators need to be trained in how best to serve ELL students instructionally. Instruction can take place online, blended, or in a traditional classroom. If a traditional classroom is where ELLs are found to have the highest success, how do educators make changes in blended and online environments to increase ELL proficiency if a traditional setting is not an option?

Purpose of the Study

Online and blended classes have been compared to traditional instruction, and some question whether online and blended classroom instruction is inferior to traditional instruction. The purpose of this study was to determine if gender and/or mode of instruction have an influence on or an interactional relationship on the evidence-based reading and writing scores on the SAT. Additionally, the purpose was to compare ELLs and non-ELLs as well as to determine if WIDA proficiency scores have a predictive relationship with any of the three modes of learning (online, blended, traditional). This was done by comparing traditional, blended, and online learning instructional methods to the evidence-based reading and writing scores on the SAT. This study also investigated the effects of WIDA proficiency levels and type of instruction on SAT scores to see if there was a significant level of WIDA proficiency that ELL students need to obtain to see success in online, blended, or traditional instruction.

Past studies have shown that ELL students are most successful in a traditional instruction when sheltered instruction observation protocol strategies are used (Kavera & Echevarria, 2013). Today, ELL students have the option of taking classes online or in a blended setting. Because of the increased growth of the ELL population and the increased access to technology, it is necessary to look at online and blended instruction and how it could enhance educational opportunities for ELL students. If online and blended learning are comparable on evidence-based reading and writing scores, what is the WIDA proficiency level that needs to be achieved to be successful, if any?

Research Questions

This study investigated which factors impact the education of ELL students in a learning environment, by addressing the following questions:

1. Is there a significant difference across instructional types (online, blended, traditional) on the evidence-based reading and writing portions of the SAT for ELL students?

2. Is there a significant difference across gender (male, female) on the evidence-based reading and writing portions of the SAT for ELL students?

3. Is there a significant interaction between instructional types (online, blended, traditional) and gender for ELL students on the evidence-based reading and writing portions of the SAT?

4. Is there a significant difference on the evidence-based reading and writing portions of the SAT between ELL and non-ELL students?

5. Are WIDA scores predictive of student success on the evidence-based reading and writing portions of the SAT for the three modes of instruction (online, blended, traditional)?

Null Hypotheses

$H_0$1. There is no statistically significant difference across instructional types (online, blended, traditional) on the evidence-based reading and writing portions of the SAT for ELL students.

$H_0$2. There is no statistically significant difference across gender (male, female) on the evidence-based reading and writing portions of the SAT for ELL students.

$H_0$3. There is no statistically significant interaction between instructional types (online, blended, traditional) and gender (male, female) for ELL students on the evidence-based reading and writing portion of the SAT.

$H_0$4. There is no statistically significant difference on the evidence-based reading and writing portions of the SAT between ELL and non-ELL students.

$H_0$5. There is no predictive relationship between WIDA proficiency scores and student success on the evidence-based reading and writing portion of the SAT for the three modes of instruction (online, blended, traditional).

Significance of the Study

Seeking best instructional practices for ELL students is important as the ELL student population is increasing, as is the use of technology (Li, 2013). This study looked at how online, blended, and traditional instruction impact the outcome of the evidence-based reading and writing scores of ELL students on the Michigan state-mandated SAT test for all juniors in high school. As the ELL population grows and the use of technology increases in instructional practice, what are the best practices for the ELL student in the educational setting? Educators would be able to use the data to have research-based evidence when making decisions on what

method of instruction is best practice for ELL students (online, blended, or traditional), and if WIDA proficiency level impacts the decision.

If ELL students are scoring similar scores in all instructional methods or have increased scores in the blended and online learning, this would continue to impact the upward trend of online learning. This would also impact the instructional design of blended and online learning for the ELL student. The cognitive theory of multimedia learning and second language acquisition theory would also have a significant influence on the instructional design for ELL students.

Methodological Brief

Quantitative research is "collecting numerical data to explain a specific phenomenon" (Muijs, 2011, p. 2). In quantitative research, relationships between independent and dependent variables are identified within a population (Field, 2013). "Statistical methods are used to collect, analyze and interpret data, and relationships in data" (Hoare & Hoe, 2013, p. 2). Quantitative research design is chosen when associations can numerically be measured. The data are measured through appropriate statistical analysis.

In this study, the data on the ELL and non-ELL 11th grade class of 2019 students (evidence-based reading and writing scores SAT, gender, WIDA proficiency) in the state of Michigan and instructional methods (online, blended, traditional) used by Michigan public and charter schools were collected through the Michigan Education Research Institute (MERI). A two-way factorial analysis of variance (ANOVA) was used to identify if the ELL score on the SAT significantly differed based on type of instruction (online, blended, traditional), and identified if the ELL student score on the SAT significantly differed based on gender (male, female). The two-way factorial ANOVA identified if there was an interaction between modes of

instruction (online, blended, traditional) and gender for ELL students on the evidence-based reading and writing portions of the SAT. A *t*-test was used to identify if there was a difference on the evidence-based reading and writing SAT scores between ELL and non-ELL students. A simple linear regression was used to identify if a predictive relationship exists between student success on the evidence-based reading and writing portions of the SAT and each mode of instruction (online, blended, traditional).

Assumptions

Assumptions are unexamined beliefs based on prior knowledge and experience (Simon & Goes, 2013). Assumptions for this study are that traditional learning would have the most significant impact on evidence-based reading and writing SAT scores. Second language acquisition requires the ability to speak and listen to the language: the audio portion of the dual coding theory. Online and blended learning students would have less opportunity to listen and speak the language.

Limitations

"Limitations are factors that are beyond the control of the researcher" (Price & Murnan, 2004, p. 1). In this study limitations include generalizability of the sample and data collected on public schools in Michigan. Generalizability is the extension of results from a study to the larger population. For this research, generalizability of the data is limited because not all schools in Michigan have a significant ELL population and, therefore, the results may not apply to them specifically. Still, the findings should have relevance for all schools who are interested in the relationship between instructional method and evidence-based reading and writing SAT scores.

In addition, the state of Michigan does not require schools to identify as a one-to-one with technology, which impacts the blended learning data. One-to-one with technology is when

every student has a personal technology device to use that is provided by the school district

(Chang, 2016). To minimize this limitation, school district data was only used from districts that

are confirmed as a one-to-one high school.

Delimitations

Delimitations are controls purposely built into the design of the research pertaining to

sample selection (Simon & Goes, 2013). A delimitation of this study was that the sample

population was limited to the state of Michigan. It was limited to this area based on the state of

Michigan mandate that all high school juniors take the SAT as a measure of college and career

readiness. The SAT is a standardized test that is commonly used across the nation to determine

college and career readiness. This delimitation would limit the generalizability of this study for

students that are not required to take the SAT or have a different standard for college and career

readiness.

A second delimitation was that this study was only focused on SAT scores regarding the

statistical significance of the effect of WIDA proficiency and course delivery method (online,

blended, traditional). This delimitation would also limit the generalizability of this study for

students that are not required to take the SAT or have a different standard for college and career

readiness. The data from this study was collected solely on public and charter schools. Private

schools were not in the sample size.

A final delimitation was that the study was confined to high school ELL students. This

study focused primarily on ELL students, so it was important that ELL students are the

participants of the study. High school students were selected as the participants as they are

mandated to take the SAT.

Definitions of Terms

The following terms are essential to the research study:

Blended learning instruction: The blended learning model incorporates both traditional methodologies and online methodologies intertwined together to increase learning and engagement in the classroom (Accelerole, 2018). In this study school districts that were one-to-one with devices were identified as blended learning (Maxwell, 2016).

Distance learning: Distance learning is taking classes that are not located in a physical classroom; teacher and student are not in the same physical space (Anderson, 2004).

ELL: English language learner is a person not born in the United States, and whose native tongue is not English, or a person who comes from an environment where the native tongue is not English (Migration Policy Institute, n.d.-a).

Online instruction: Online instruction is a form of distance learning, where 80% of the instruction takes place on the internet (Stern, n.d.).

SAT: **"**The SAT (Scholastic Aptitude Test) is an entrance exam used by most colleges and universities to make admissions decisions" (The Princeton Review, n.d., para.1).

*SIOP***:** SIOP (sheltered in place observation protocol) model is a research-based and validated instructional model that has proven effective in addressing the academic needs of English language learners throughout the United States (Center for Applied Linguistics, n.d.).

Traditional instruction: Traditional learning is learning that takes place 100% in a classroom, where direct instruction is the primary method of teaching (Anderson, 2004).

WIDA: Organization that develops and provides tools and support to help multilingual learners and their educators succeed (WIDA, n.d.).

WIDA proficiency: World-class Instructional Design and Assessment proficiency is a

level of 1–6, where a 1 is entering (beginning) and a 6 is reaching (able to connect complex ideas

in speaking, listening, writing, and reading) (WIDA, n.d.).

Summary

Education has been evolving globally over the past 20 years. Technology and the internet

are the driving force behind this internationally changing landscape of teaching and learning. The

changing landscape has provided opportunities to learn online or in a blended learning

environment, aside from the traditional classroom. Internet accessibility has continued to grow

over the last 20 years, and now the internet is universally available in the United States (Institute

of Education Sciences, n.d.). The access for students to technology and the internet has allowed

the integration of blended learning and online classes in the education system.

As technology has grown and changed the look of education, the population of ELL

students has also steadily increased over the last 30 years. In the state of Michigan, the percent of

limited English proficient persons was 2.1% in 1990, and 3.4% in 2017 (Sugarman & Geary,

2018). The number of ELLs in grades K through 12 during the 2015–16 school year in the

United States had increased to over 4.8 million; this represents 10% of the enrollment in public

schools. In the state of Michigan, the ELL student population in grades K through 12 was 5.5%.

The ELL population is in a steady increase and requires all educators to take notice and make

appropriate accommodations. To make accommodations, educators need to be trained in how

best to serve ELL students.

To serve ELL students well, educators must understand the mode of delivery of

instruction that best facilitates the learning process. This quantitative study would help educators

understand at what WIDA proficiency level (1–6) ELL students gain success on the evidence-

based reading and writing portions of the SAT, looking at online instruction, blended instruction, and traditional instruction.

CHAPTER 2

REVIEW OF THE LITERATURE

The literature review provides background knowledge on learning strategies, the use of technology for educational purposes, the history of the SAT test, WIDA test, frameworks of theory to approach teaching and learning, and a summary of the findings of information. Learning strategies are reviewed to address strategies for online learning and traditional methods. The use of technology for educational purposes is reviewed as an integral part of the study. The SAT test and WIDA test are reviewed, as these test scores would be used in the research. Then, a review of the frameworks of theories that address student learning, technology in education, ELLs, and areas that affected the outcome of this study are discussed. The chapter then wraps up with a summary of the information found regarding the elements of this study.

Learning Strategies

Learning strategies are methods utilized to increase content knowledge (Alharbi, 2012). These strategies have techniques embedded that assist in increasing memory and critical thinking. Learning strategies would change the design of instruction to increase the learning that takes place (O'Neil, 1978). The learning strategy selected would have an impact on the relationship between the interaction in three ways, "For students: interaction with content, interaction with teachers, and interaction with peers" (Alharbi, 2012, p. 10). These interactions

impact learning outcomes (Rourke et al., 2001). This section covers the following instructional types: traditional, distance, online, and blended learning.

Traditional Learning

Traditional learning is where an educator facilitates the outpouring of content knowledge from a physical classroom setting, and face-to-face or in-person instruction is the primary mode of teaching (Anderson, 2004). Learning takes place in three ways: teacher to student, student to student, and teacher to curriculum (Alharbi, 2012). Curriculum is the academic content the teacher uses in the classroom. Prior to the invention of technology, all education was taught by traditional methods. The benefits to the traditional classroom are students can interact with one another on a regular basis, teachers can observe students and how they are responding to content, and teachers can make sure students are on task during the lesson. Disadvantages of the traditional classroom are both student and teacher must be in the same location at the same time, and learning can be boring for students which leads to a lack of engagement to the content.

The process of learning a language through memorization and rules is teaching in the traditional framework (Diallo, 2014). Memorization of language vocabulary, rules, and facts was the main method used to teach a new language prior to the increase and accessibility of technology. Traditional second language teaching was defined as follows:

> The way to develop competence in a second language is by language learning. We would use the term "learning" henceforth to refer to conscious knowledge of a second language, knowing the rules, being aware of them, and being able to talk about them. In non-technical terms, learning is "knowing about" a language, known to most people as "grammar", or "rules." (Diallo, 2014, p. 19)

The structure of traditional teaching can cause stress and anxiety because of the rigidity of the structure. Traditional classroom ELL students are afraid of being ridiculed for not pronouncing words appropriately (Biswas, 2019).

Traditional methods for teaching ELLs are either a push-in or pull-out system. A push-in approach is when an ELL teacher is in the classroom with the content specialist teacher and provides necessary supports for the ELL student (Honigsfeld, 2009). In a pull-out approach, the ELL student attends class at an external location from the core content area classes, and a qualified ELL teacher provides language support practices for the ELL student. "These classes may be all day or for selected periods during the day" (Short, 2018, p. 11).

Distance Learning

Distance learning involves taking classes that are not located in a physical classroom. Distance education courses offered by public school districts in the United States have steadily increased since 2002–2003. In 2002–2003, the percent of public schools offering at least one distance education course in the United States was 36% (Institute of Education Sciences, n.d.). In 2004–2005 the percent grew to 37%, and in 2009–2010 the percent of public schools offering at least one distance learning course was 53%. Further, in 2017, postsecondary institutions in the United States reported the percentage of postsecondary students enrolled in at least one distance education courses was 33.7% (Institute of Education Sciences, n.d.).

Distance learning classes have three key relationships that take place: teacher to student, student to curriculum, and teacher to curriculum (Alharbi, 2012). Student to curriculum is the engagement of the student with the content. Teacher to curriculum is the content of the course that is provided to the student. These connections are important as they lead to some challenges in the distance learning platform as well as advantages to the platform. A disadvantage, if not

addressed through the teaching format, is that students do not interact with one another and can

feel isolated (Markova et al., 2017). Class discussion boards, Google Docs, and group projects

are examples of methods that can be incorporated for students to have interaction in distance

courses. An expectation of distance learning is the student needs to be motivated to learn and

able to work independently. Advantages of distance learning are the student's physical presence

is not needed in a distance learning class, and the learning process is flexible and can be done

either synchronously or asynchronously.

Synchronous learning is when the class takes place in real-time; all students, no matter

their location, are receiving the lesson from the teacher at the same time (Markova et al., 2017).

Lessons would be in a digital format, and instruction is received through technology. Research

by Markova et al. (2017) shows that students find distance learning effective if the teacher has

"the ability to effectively utilize active learning techniques, integrate high level of interaction and

collaboration in the instructional design and provide timely student support" (p. 686).

Asynchronous is when the class takes place on a time-delay (Diallo, 2014). The teacher

posts the lesson and expectations, and the students complete the tasks within a given time.

Asynchronous learning has been criticized because of the lack of student interactions with one

another; however, students choose the time to complete school assignments based on the window

of time that was given by the instructor. This allows students to process information and meet the

needs of the time constraints of their day.

Advantages to taking distance courses, as written in a study by Markova et al. (2017), are

students in postsecondary can "combine work and study (72%), you can get your education at

your place of residence (58.6%), the flexibility in learning time (26.1%), and it is a reasonable

tuition fee (24.7%)" (p. 688). This study reported the percentage of students that enroll in

distance learning courses do so because of the flexibility of combining work and study, the percentage that prefer the incentive of learning from home, the percentage that like the flexibility of learning time. Distance learning removes the need of students and teachers being in the same location at the same time. Instead, students can learn at times that are most convenient for them.

Online Learning

Online learning, e-learning, or virtual learning are terms used interchangeably. Online learning is education where at least "80 percent takes place over the internet" (Stern, n.d.). Online learning is the most common platform of distance learning; however, it is not the sole platform of distance learning. Online learning involves in-person interaction between the student and the teacher. Distance learning has no in-person interaction between student and teacher.

> Online education has been increasing significantly in the last 15 years. The online learning report tells us 5.6 million students are taking at least one online course in postsecondary. The fall of 2009, an increase of one million over the number reported in 2008. [That is] a 21 percent growth rate for online enrollment, which exceeds the less than 2 percent growth of overall postsecondary student population. (Badiru & Jones, 2012, p. 154)

The data show that 30% of postsecondary students take at least one online course (Allen & Seaman, 2010; Badiru & Jones, 2012). These numbers are important at the secondary level as we are seeing an increase in online learning opportunities. There is no compelling evidence currently that shows the continued significant growth in online enrollment is coming to an end (Badiru & Jones, 2012). To that point, the Babson Survey Research Group provided the following evidence regarding

the perception of the relative quality of online instruction compared to face-to-face or traditional classroom instruction.

> In 2003, 57.2 percent of academic leaders rated the learning outcomes in online education as the same or superior to those in face-to-face. The number is now 77.0 percent. A minority (23.0 percent) of academic leaders continue to believe the learning outcomes for online education are inferior to those of face-to-face instruction. Academic leaders at institutions with online offerings have a much more favorable opinion of the relative learning outcomes for online courses than do those at institutions with no online offerings. (Allen & Seaman, 2013, p. 5)

These data are important for secondary students.

Online education started to come into practice in the mid-1990s (Perry & Pilati, 2011). During the transition from an in-person (traditional) teaching model to an online learning experience, communication was mainly done through email (Diallo, 2014). In the early stages of online learning, electronic instructional resources, such as websites, videos, and e-libraries were used to support online learning. As online learning has grown astronomically, internet-based Learning Management Systems (LMS) have been developed to house the online course (Alharbi, 2012). The LMS houses the resources, lesson plans, video lessons, video conferencing tool, grading system, and communication tools between teacher/student and student/student (Perry & Pilati, 2011). A few well known LMSs are Blackboard, Schoology, and Canvas. LMSs are being used at both K–12 and postsecondary institutions. The LMS also facilitates blended learning in the classroom, and more recently e-learning days for school districts. An e-learning day is a day in which students and teachers are unable to meet in person due to circumstances such as weather or scheduling.

Advantages of online learning are significant. According to Daymont et al. (2011), online learning is convenient and flexible for students and parents. Students can access the internet every day and all day. Students that do not feel confident communicating in front of an entire classroom of peers are more confident to contribute in an online setting. Technology devices provide tools for students to create and build their representation of a learning target as an individual or in a group (Diallo, 2014). Distance is a non-issue; students can work together no matter what their location with internet accessibility. Student engagement and collaboration are increased, as students would engage in online discussion and group work. There is greater equity among students, so long as the teacher and student have had prior training in using the online devices, all students have access to internet, and a technology device. Discussion groups are easily established through a learning management system (Alharbi, 2012). "A key advantage for ELL students is learning takes place on the students' timeline and pace, and therefore adaptable to students with different learning styles and cultural backgrounds" (Alharbi, 2012, p. 14). Accoriding to Diallo (2014), students construct a schema which develops higher order thinking skills and then develop questions they may not ask in a traditional setting. Students develop a mental representation of content learned that enables them to organize knowledge into categories or schema. Online learning can be a time saving personalization of learning. Teachers also benefit from online learning in reduced time lecturing, the content that is prepared is easy to publish and update, and they become facilitators of information rather than the sole source of information (Diallo, 2014).

On the other hand, disadvantages of online learning are student motivation/discipline, the time educators need to prepare for online classes, and technology support and infrastructure. Students need to have discipline to be successful in online learning; 80% of academic leaders in

2007 believed students need to be more disciplined in online education, and in 2012 that number

has jumped to 88.8% (Allen & Seaman, 2013). Academic leaders with exposure to teaching

online courses "report it takes more time and effort to teach online" (Haugen et al., 2001, p. 128).

Students need to be disciplined in time management and set the appropriate amount of time aside

each week to work on courses. Frustrations from a faculty perspective are the need for the online

platform to work, and the importance of technology support when the technology is not working.

Other disadvantages are as follows: "difficulty communicating instantly, internet connection,

lack of appropriate assessment of students' needs and delivery mechanism, and lack of

professional development for staff members assigned to online programs" (Diallo, 2014, p. 36).

A key component, and challenge, of online education is assuring the quality of the online

learning structure and content (Haugen et al., 2001, p. 129). These challenges are learning how

"to assess the educational content that was disaggregated, learning how to assess the online

learning experience of the student, and the evaluation of the online instructor" (Alharbi, 2012, p.

18). As we move into more online courses it is important to know the curriculum provided to

students during online instruction is received in a manner that the desired mental schema are

created. The need for teacher evaluation tools for online instructing needs to continue to be

developed (Alharbi, 2012).

Over a 10-year period of data tracking in the United States for online learning, it was

reported that 69.1% of institutions believed online learning was significant in the long-term goals

of the academic institution (Alharbi, 2012). This statistic suggests online education is not going

away, but research on solving the disadvantages would continue. It was witnessed during the

pandemic most students moved to online learning and new technology platforms were utilized.

The movement to online was not planned, but forced, which significantly increased online courses in both secondary and postsecondary.

Blended Learning

The terms blended or hybrid learning are used interchangeably. According to Horn and Staker (2015), "blended learning is any formal education program in which a student learns at least in part through online learning, with some element of student control over time, place, path, and/or pace" (p. 58). The student learns at least partially in a physical building with instructors (face-to-face), and the remaining part is the online instruction, which is integrated with face-to-face to deliver the content of the course. The blended learning model incorporates both traditional methodologies and online methodologies intertwined together to increase learning and engagement in the classroom (Accelerole, 2018). The blended approach does not negate the need for a face-to-face teacher (Means et al., 2013). Blended classrooms have shown educational gains by creating a learning environment with the benefits of a traditional classroom and an online virtual opportunity. The online content in a blended environment is usually referred to as "e-learning" (Diallo, 2014).

According to Lorenzetti (2004), the advantages of a blended classroom are the accessibility to technology, the adaptability of the education based on need, and the flexibility of technology combined with the in-person time with the teacher. The integration of technology with the traditional classroom is designed to develop independent learners and provide students with the opportunity to dive deep into their education. Blended learning also helps to increase active learning and student engagement, which increases student knowledge constructs, and increases collaboration practices. "Another benefit is that of improved student outcomes" (Partridge et al., 2011, p. 5). Data from the University of Wisconsin supported that students

performed better on exams and wrote better papers (Partridge et al., 2011). According to

Accelerole (2018), the benefits of blended learning also include cost efficiency, consistent pre-

training, accessibility, and space. Students do not have to purchase labs or textbooks if materials

are online. They can use virtual specimens and news articles online. Consistent pre-training

allows all students the ability to receive the same materials and view them prior to the start of

class. Blended learning allows access to the content anywhere and anytime. Accessibility allows

learners to be connected when it is most convenient for them. The blended learning format leads

to an increase in user engagement, and multimedia and instructional design can lead to rich

learning. Finally, the physical space for classroom learning is decreased, and learners can go

back and review materials anytime.

Conversely, one disadvantage of blended learning as stated by Tosun (2015) is, "Teachers

need training on how to employ blended learning instruction model effectively, because online

courses, no matter how efficient they are, cannot facilitate learning by itself. Digital tools are only as

good as the teachers" (p. 646). Similarly, students need training and access to the technology

required for the blended learning classroom. In addition, students need to have the motivation

required to access and complete educational expectations that do not occur during the traditional time

of the class (Allen & Seaman, 2013). Students need to be disciplined in time management and set

the appropriate amount of time aside each week to work on courses (Haugen et al., 2001). The

disadvantages of blended learning mirror the disadvantages of online learning.

Blended learning has been defined and identified the advantages and disadvantages to

blended learning. Blended learning looks differently based on the type of model used. For

example, blended learning environments can vary based on student level of knowledge or prior

experience with the use of technology. In a blended learning scenario, students could meet face-

to-face two days a week and virtually three days a week, or a variation of that. There are four models of blended learning; they would be described in the following sections: rotation, flex, a la carte, and enriched virtual. In this study blended learning is defined for schools that are one-to-one with technology (Maxwell, 2016).

Rotation

The rotation model takes place in the classroom where students rotate through different learning activities (Christensen Institute, 2016). One of the rotations is an online learning activity. Other activities could be small group collaboration, individual teacher instruction, peer-to-peer learning, or independent learning time. Teachers at the elementary level have used station rotation for several years; this model incorporates a station with online learning (Horn & Staker, 2015). Learning takes place on a school campus in a classroom with a teacher. The start and end of each station is directed by the instructor. Four sub models exist within the Rotation model: "Station Rotation, Lab Rotation, Flipped, and Individual Rotation" (Christensen Institute, 2016, p. 1).

Station Rotation. The station rotation model is when students rotate through learning activities (Christensen Institute, 2016). The station rotation can take place in a classroom or a set of classrooms (Horn & Staker, 2015). The teacher directs what activities students would participate in and the length of time. The teacher directs when it is time to move to the next activity. The activities students move through contain at least one online learning activity. This model is commonly seen in elementary classrooms that have one-to-one technology available (Christensen Institute, 2016). An example of station rotation is small group direct instruction to start, technology based individual learning, and then whole group discussion to finish (Horn & Staker, 2015). The device could be a tablet, Chromebook, laptop, or desktop computers.

Lab Rotation. "The Lab Rotation model is similar to Station Rotation" (Christensen Institute, 2016, p. 1), but the difference is when students rotate through activities, they rotate to a computer lab, which is separate from the classroom (Horn & Staker, 2015). The purpose is to free up classroom space and the classroom teacher to allow for flexible scheduling. The flexible schedule helps school districts financially and provides more time for ELL services, special education services, and remediation. When students rotate to the computer lab it is connected to the learning that was taking place in the classroom. In the past, the computer lab was used as another class, not as an extension of education.

Flipped Rotation. The flipped rotation model is when students learn the content independently through online video lectures that the teacher creates or uploads from the internet (Christensen Institute, 2016). The flipped model is when independent learning takes place outside of the classroom. Class time is then used for homework, guided supervised practice and individual assistance when needed. In a traditional classroom setting, the teacher gives the lecture and the students do not have much time for practice and questions before they head home. The flipped model allows students to watch the lesson at home and bring their questions and practice into the classroom with the physical instructor (Horn & Staker, 2015). This model also gives students ownership over their learning. Students get to choose when to watch the video and they can review the section that they did not understand, as needed. The question to ask for educators is "what is the best use of your face-to-face time?" (Horn & Staker, 2015, p. 67). The flipped model is generally seen at the secondary level.

Individual Rotation. The final sub-model is the individual rotation model. This model is used to personalize the education experience to each individual student (Christensen Institute, 2016). "The teacher or an algorithm sets each student's daily schedule based on the student's

educational needs" (Horn & Staker, 2015, p. 69). Students would not rotate through all the same activity stations; however, some of the stations would be online learning activities. This model best addresses a student's individual needs since it is designed for differentiation and personalized learning. Paraprofessionals and instructors are available to help with instructional needs.

Flex

The flex model of blended student learning takes place with a teacher as a facilitator and students working at their own pace online (Christensen Institute, 2016). The flex model was first seen in alternative education schools where students were making up missed credits in online courses (Horn & Staker, 2015). Flex takes place 75% online, with 25% given by the teacher as the in-person facilitator. Students can choose when they work on their course work. The students work in a classroom on their online coursework where a teacher is available to dive deeper with the content with in-person delivery. Flex is also used for students to take advanced courses or courses they are interested in that are not offered at their school face-to-face. This model of blended learning used for credit recovery, advanced courses, or courses not offered face-to-face is mostly seen at the secondary level.

A La Carte

In the a la carte model students choose courses their school does not offer in-person to take online (Christensen Institute, 2016). The a la carte model is seen at the high school or postsecondary level (Horn & Staker, 2015). This blended model provides more opportunities for students in course selection. Students can experience content they otherwise would not have had the opportunity to learn. The courses would be completed during study hall or after school. The difference between a la carte and flex is that in a la carte the online teacher is the teacher of

record. In flex, the classroom teacher is the teacher of record (Horn & Staker, 2015). A la carte provides educational opportunities that students would otherwise not have.

Enriched Virtual

The fourth blended learning model is enriched virtual. It is primarily online with supplemental instruction from in-person learning sessions (Christensen Institute, 2016). Enriched virtual has in-person classes, but does not require in-person every day (Horn & Staker, 2015). Virtual schools are using this model to supplement the online portion. It is not considered online because a portion of the learning requires in-person delivery. This model allows for in-person support of online instruction, which allows students to feel confident because they have a teacher to ask questions directly when needed.

Summary of Learning Strategies

Traditional, distance, online, and blended learning are four types of learning that can take place in the educational process. Traditional is in-person instruction in the classroom. Distance learning takes place away from the school and is either synchronous or asynchronous in the delivery method. Online learning is a form of distance learning and takes place on the internet. Blended learning is a combination of in-person and online learning. My research focused on traditional, online, and blended learning. The blended model that would be used in the classrooms of my study is the rotation model.

The Use of Technology for Educational Purposes

Advances in technology have revolutionized educational pedagogy at all levels of education, from pre-K to doctoral level studies (Rajaei & Aldhalaan, 2011). Once technology became widely available in homes and personal devices across the country, then technology in the classroom at all age levels has become common at most institutions (Schindler et al., 2017).

The increased availability of high-speed internet at public and private institutions means "students are more likely to take advantage of the resource when it is needed" (Kennedy, 2012). In light of the advances in technology, institutions have increased offering hybrid, online, and educational video programs than in past years (Rajaei & Aldhalaan, 2011). The increase in online and blended courses for students it is necessary to study student engagement. The research by Deslauriers et al., (2019), looks at student engagement. The research supports that students are more engaged in learning when modern technology methods are used in the pedagogy of the learning process compared to the traditional method in the classroom: "Study shows students in 'active learning' classrooms learn more than they think" (Deslauriers et al., 2019, p. 19251). The combination of the increased advancements in technology and the research that supports learning with technology is increasing online and blended learning opportunities. Another study by Chen et al. (2017) stated, "The results indicate that a student's ability to work in an intentional and motivated manner, and the greater cognitive effort that results, carries more weight than does the course delivery method" (para. 1). Further, "The phenomenal growth of distance learning in its various forms has had a tremendous impact on the education landscape, from universities to high schools and even primary schools" (Chen et al., 2017, para. 2). In a study by Schindler et.al., (2017), "digital games, web-conferencing software, and Facebook had the most far-reaching effects across multiple types and indicators of student engagement, suggesting that technology should be considered a factor that influences student engagement in existing models" (p. 22). In summary, when students are engaged and motivated, students have a deeper level of cognitive growth, and instructional delivery method is not a factor. This information is valuable to educators in making research-based decisions on instructional methods.

Assessing the efficacy of virtual curriculum and the necessary standards to be learned compared to the traditional methodologies is important (Diallo, 2014). In meeting the learning needs of ELLs, it is also important to ensure the efficacy of the virtual curriculum. Considering the needs of ELLs, translation of the language and the opportunity to work at their own pace would be an advantage of online learning. Online classes have been used for at-risk high school students or students that have fallen behind academically for various reasons. However, the efficacy of a virtual classroom compared to a traditional classroom to consider the advantages for English learners still needs more research. In a study by Varzaneh and Baharlooie (2015), they looked at classroom instruction and compared online to traditional to identify the effect on creative thinking of Iranian EFL learners. Varzaneh and Vaharlooie (2015) stated the following:

> The analysis of the results highlighted the advantages of application of virtual classroom over the traditional classroom in creative thinking performance of learners. The first advantage is the development of learners' independent performance to solve problems and their abilities as a result in which helps them in the future. (p. 186)

In assessing online instruction compared to traditional for ELL students, it is reported that online learning is valuable for creative thinking and problem solving (Varzaneh & Vaharlooie, 2015). It is important to have data on ELL student depth of understanding, and to see how their English proficiency impacts their depth of understanding in online instructional practices.

The exponential growth of online learning in several formats has impacted education, from online virtual high schools to high schools offering online courses alongside their traditional classes, to college and universities offering online distance courses (Diallo, 2014). Not only schools, but also businesses are utilizing online education for continuing education and professional development opportunities (Chen et al., 2017). The utilization of technology for

instructional purposes is seen at the primary, elementary, middle, secondary, and postsecondary education levels and in the career workforce (Chen et al., 2017; Diallo, 2014).

Implementation of Online and Blended Learning Systems

Implementation of online and/or blended learning requires the consideration of multiple issues, one being assessment tools (Kruger et al., 2015). The school district should decide if online learning can benefit students or a group of students and their learning outcomes. A Learning Management System (LMS) needs to be selected for the online access of curriculum and assessment. The LMS system should meet the needs of best practices. Finally, the process of online implementation should be mapped out with fidelity and assessed for areas of improvement.

Standardized Testing

Standardized testing requires students to take a test that has the same questions for all test takers to answer, or questions from a bank of questions that are graded on a consistent standard which allows for comparability of individual performances or a group of student performance (Education Reform, 2015). Standardized testing can be used for various purposes including testing intelligence (IQ test), reading readiness, college entrance, and even school accountability. In this study, the standardized testing reviewed are SAT testing and WIDA proficiency testing.

The history of standardized testing in the United States began in 1838, when teachers began communicating content information that would be converted into a test (National Education Association, n.d.). Educators utilized written assessments prior to the Civil War, to measure student knowledge in specific courses. By the end of World War I, several new testing instruments had been developed, resulting in a pendulum swing from assessing mental capacity to measuring college readiness. Harvard President Charles William Eliot in 1890 proposed an

entrance exam to colleges across the country that would take the place of the separate entrance exams given by every institution. The College Entrance Examination Board was created in 1900. Alfred Binet, a French psychologist began developing the standardized intelligence test in 1905, known as the IQ test or the Stanford-Binet Intelligence test. During World War I, Army aptitude tests were given to soldiers to assign jobs. Edward Thorndike, a professor from Columbia University, and his students, created multiple standardized assessments between 1908 and1916. The American Psychological Association recruited Lewis Terman to develop an Army intelligence test. More than 100 standardized tests to measure academic achievement existed by 1918. "In 1925, the U.S. Bureau of Education Survey reported that intelligence and achievement tests were increasing in use to classify students" (National Education Association, n.d. para. 18). In 1930, multiple choice tests were embedded in school assessment. The first automatic test scanner was developed in 1936. In 1965, the Elementary and Secondary Education Act increased the use of standardized testing. The No Child Left Behind Education Act in 2001 was an educational reform that used standardized testing on students as accountability for schools. Standardized testing has been around for over 100 years, and there are arguments for and against their use.

A Nation at Risk was a report released in April 1983 that posted data that the United States was in danger of becoming illiterate, according to the authors, due to significant deficiencies in multiple academic areas (Gardner, 1983). This report demanded educational reform. This, coupled with President George Bush's No Child Left Behind Educational Act (2001), mandated standardized testing in schools for students in grades 3–12, across the country. The high stakes testing was a measure of accountability for schools and would grade schools on their Annual Yearly Progress (AYP). The 2013–14 school year was the deadline for the No Child

Left Behind Act. The goal was for 100% of students to be "proficient" in math and reading (No Child Left Behind [NCLB], 2002; Klein, 2015).

Standardized testing holds an important place in education. Standardized tests, when tightly aligned to academic standards, and those standards are matched in the educational setting, provide accurate data on student knowledge in the content area (Phelps, 2006). The data received from standardized testing can be used for diagnosis of students, teachers, and districts. Standardized tests can help with motivation and creating goals when what is being measured is also being taught. Eliminating standardized testing would eliminate an effective way to measure district wide performance.

On the other hand, the impact of standardized testing in schools has led teachers to "teach to the test," instead of creating an atmosphere of problem-solving and opportunities for critical thinking (Klein et al., 2006). Teachers are under pressure to make sure their students are successful on high stakes testing because teacher evaluations are tied to their students' success (Wright, 2002). In addition, students have increased anxiety as high stakes tests in high school, if passed, lead to graduation. Further, minority students and specifically ELL students are at a disadvantage on standardized testing even though the U.S. Department of Civil Rights tells us high stakes testing should not have a disparate impact on English Language Learners (Wright, 2002, p. 3). Despite the professional guidelines, research findings by Wright (2002) support the position that ELLs are impacted negatively with high stakes standardized testing, and this is leading to the academic neglect of the needs of ELLs. Another study by Solórzano (2008), on implications of high stakes testing on ELLs, concludes that high stakes tests as currently constructed are inappropriate for ELLs. Most critical of all is their use for high stakes decisions that have negative consequences. This study reviewed achievement assessments to analyze them

relative to their norming samples and validity to determine usefulness to ELLs (Solórzano, 2008). Based on research it is concluded that high stakes testing impacts the teacher, student, minoritized student, and school district negatively.

SAT Testing

The College Board was developed to determine scholarship eligibility and college admission by a single test (Ellrich, 2014). In 1923, a committee was created by the College Board and led by Carl Brigham; the purpose was to create a test that could be utilized by more schools (PBS, n.d.). In 1926, the first SAT (Scholastic Achievement Test) was administered to high school students by College Board. In 1934, Harvard used the SAT for scholarship eligibility. In 1935, Harvard required all students to take the SAT for admission. All Ivy League schools required the SAT as a qualifier for acceptance by the end of the 1930's (Ellrich, 2014).

The University of California adopted the SAT as an admissions requirement by 1960 (Ellrich, 2014). "While the exam has been through a few changes along the way with another major revision scheduled for this next cycle, it remains the most prominent college entrance exam to date with over 1.66 million college-bound students having taken the test in 2013 alone" (Ellrich, 2014, p. 10).

In 2016, the state of Michigan began using the SAT as the college and career marker for all public schools (Feldscher, 2015). "The College Board's SAT test is respected and used around the country, said State Superintendent Mike Flanagan in a statement, and Michigan high schools work with them now through their Advanced Placement program that helps students earn college credits while in high school" (Feldscher, 2015, para.3). Not only is the SAT respected, but more importantly, the SAT is designed to measure cognitive ability or general intelligence (Wai et al., 2018). Sackett et al. (2012) examined the correlations among socioeconomic status,

SAT scores, and college admissions and found that socioeconomic status and SAT scores are positively correlated. Students from higher socioeconomic backgrounds generally test higher on the SAT. Since the state of Michigan has chosen the SAT as the college and career indicator, it is important to understand the implications.

The SAT is comprised of three main parts: math, evidence-based reading, and writing (College Board, n.d.). Student scores range in total from 400–1600 as a combined score of math and evidence-based reading and writing. Math ranges from 200–800, and evidence-based reading and writing are from 200–800. The national average for the graduating class of 2019 on the evidence-based reading and writing scores of the SAT was 531. This study examined the evidence-based reading and writing SAT scores of ELL students.

WIDA Testing

"The WIDA (World-Class Instructional Design and Assessment) test ACCESS for ELLs (Assessing Comprehension and Communication in English State-to-State for English Language Learners) is administered to all students identified as ELLs in grades K–12 across the United States" (WIDA, n.d., para.1). ACCESS measures the WIDA standards, which measures English proficiency and progress. Every Student Succeeds Act (2015), or ESSA, is a U.S. federal requirement to monitor and report the progress of ELLs in English proficiency, and WIDA testing meets this requirement (WIDA, n.d., 2014). ACCESS (name of WIDA test) assesses the following four domains: reading, writing, listening, and speaking of the English language. The four domains are tested and graded according to a proficiency score of 1 through 6. Each domain score is averaged to produce a composite score of a proficiency level of 1 through 6. A score of 1 indicates a student is new to the language, and a 6 suggests that the student is proficient in the language.

Summary of Standardized Testing

In my review of several different standardized tests, the SAT and WIDA (ACCESS for ELL's) standardized tests are the two tests that was used while conducting this study. The common metric of the standardized data was used to glean information into best practices for ELL students. Evidence-based reading and writing SAT scores and WIDA proficiency were the common metrics used.

Theoretical Framework

Several theories exist regarding teaching and learning that correlate with current research in a traditional classroom and learning virtually. It is also important to understand how ELLs acquire a second language and what that process entails (Diallo, 2014). Figure 1 illustrates how learner-centered theories support the acquisition of language through and with technology.

Figure 1

Theory Framework Overview
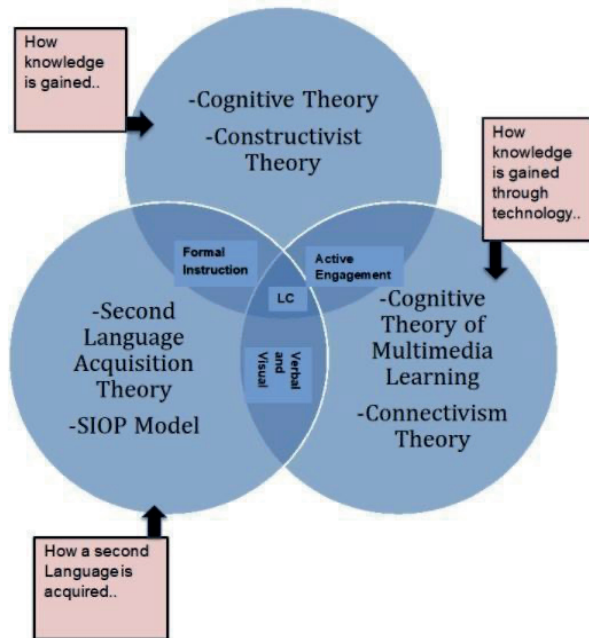
Note. Learner-centered theory is at the center of all learning theories (Stefaniak, 2015). Cognitive

theory and constructivist theory are the theories for understanding how knowledge is gained

(Diallo, 2014). The cognitive theory of multimedia learning and connectivism theory are the

theories used for how knowledge is gained using technology (Mayer, 2014). Active engagement

is required in both how knowledge is gained and how knowledge is gained through technology.

Second language acquisition theory and the SIOP Model are used in understanding how a second

language is acquired. Verbal and visual modes of processing information are utilized in

knowledge gained through technology and how a second language is acquired. Finally, formal

instruction is required in both acquiring a second language and how knowledge is gained.

In the following sections the theories are reviewed that apply to how knowledge is gained, how knowledge is gained with the use of technology, and how a second language is acquired, all with the learner-centered approach at the forefront. After each description, the importance of how the theory relates to a traditional classroom environment, to students that are ELLs, and the use of technology in the classroom. It is important to review theories and identify theories to understand how knowledge is gained around online learning, blended learning, and traditional learning for ELLs (Alharbi, 2012).

Learner-Centered Approach

The learner-centered, also referred to as student-centered, approach is where the student is at the center of the learning and is responsible for the learning (Stefaniak, 2015). The teacher is the facilitator of the learning. The focus of teaching shifts from the educator to the student. "In a learner-centered classroom, students are actively learning, and they have greater input into what they learn, how they learn it, and when they learn it" (Ahmed, 2013, p. 22). In the learner-centered approach students are actively engaged in the learning process which increases the teacher-student connection, increases critical thinking, and increases student learning and satisfaction. This approach to teaching allows autonomy for the student to utilize their personal resources or experiences to engage actively in the learning process. When the student takes ownership and leads their learning, a culture is created full of motivation and achievement for students.

The learner-centered approach is a method that is receiving attention in recent years (Ahmed, 2013). Education has been evolving to where teachers are expected to meet the needs of all students. This includes providing differentiated instruction to students, managing the increases in behavioral issues in the classroom, supporting social and emotional learning, and

developing independent learners (Langley, 2015). The student-centered approach allows for

needs and shifts in education while still meeting the educational needs of students (Ahmed,

2013). This approach is also important to effective e-learning or online learning.

"Learner-centered classroom instruction has three essential pieces including increased

student responsibility for learning, engagement in the content of the course, and the

implementation of formative assessments" (Larson, 2018, p. 8).). In the learner-centered

classroom, students take an active role in the learning process, and students work collaboratively

with the teacher to decide on content, projects to be undertaken, and curriculum (Darling-

Hammond, 1992). By contrast, in a teacher-centered classroom, the teacher imparts the

knowledge to students, and the students take a passive role in the learning process (Darling-

Hammond, 1992). In the "traditional or teacher-centered classroom, the instructor controls all

aspects of instruction including what would be taught, how it would be taught, and how long to

spend on each unit" (Larson, 2018, p. 8).

Critiques to the learner-centered approach are that learners are not prepared to help make

decisions on the development of a course and the content to be learned and how it would be

assessed (Abdulwahed et al., 2012, p. 57). Students' maturity, motivation, level of education,

language experience, linguistic readiness, and cultural expectations of an educators' role and the

student role in a classroom are factors that need to be considered by educators who are going to

take this approach to teaching (Tudor, 1992). Alharbi suggested "another possibility for a

teaching method: a teacher-directed and learner-centered method where the control shifts

between the student and teacher. In this teaching method, the teacher provides a scaffolding

approach for students" (Alharbi, 2012, p. 35). The scaffolding would prepare the student towards

a greater control over their own learning process. Students need to develop the necessary skills to be prepared to be successful in a learner-centered approach classroom (Weimer, 2013).

Constructivist Theory

Piaget and Vygotsky worked extensively on the developmental stages (Piaget, 1971; Diallo, 2014). Piaget believed knowledge originates within the learner, and Piaget had four principles of active learning (Piaget, 1971). The developmental theories developed by Piaget and Vygotsky have provided a foundation for the understanding of second language acquisition, the learning process, and how technology can impact that process.

In a traditional classroom setting, the expectation of equal communication between a teacher and student is not realistic if the teacher is doing all the talking and the student does not have the opportunity to talk but does the listening. The student's perception of the information told may not necessarily be what the teacher meant. The student needs to be engaged and actively a part of the learning process. Piaget's four principles of active learning: students should construct their own knowledge so it is meaningful, students learn best when they are active and interact with the material, learning should be student centered, and social interaction and student collaboration should play a role in the learning process (Pardjono, 2002). Student learning is developing knowledge through active participation in the educational platform, while teaching is developing an environment that is engaging and stimulating so that students are actively interacting with the academic content and developing understanding.

Human learning has two key components: assimilation and accommodation (Piaget's theory of cognitive development; Pardjono, 2002). Assimilation is how "an individual understands an experience in terms of their present stage of cognitive development" (Pardjono, 2002, p. 167). Assimilation occurs when an individual can connect a current cognitive schema

with a new experience. The second component, accommodation, is when an individual has an experience in the world and the experience changes the individual's way of thinking (Pardjono, 2002). When an individual changes a schema in response to a stimulus of the world, accommodation has occurred. Assimilation is the recognition of a connection in a current schema with a similar experience, and accommodation is the recognition of a difference between existing schema and a new experience of the world (Pardjono, 2002).

Vygotsky (1978) developed the concept of zone of proximal development, one of his most significant contributions to learning theories. The zone of proximal development is defined as:

> The distance between the actual developmental level as determined by independent problem solving and level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers. (Vygotsky, 1978, p. 86)

The zone of proximal development suggests there is a continuum in which a student can learn and achieve on their own to when a student requires a teacher or adult to assist in the learning process.

Constructivism theory incorporates the knowledge gained from both Piaget and Vygotsky (Pardjono, 2002). Constructivists believe knowledge is actively built through experiencing the world and connecting the experience to prior cognitive schema. The experiences are interpreted or perceived based on the developmental stage of the student. Knowledge only exists within the experiential world; "it is active, individual, personal and is based on prior knowledge" (Pardjono, 2002, p. 172). Constructivism theory emphasizes the importance of interaction in the world, and peers are a part of that environment. By using technology in online learning, students are

interacting with peers in synchronous online courses, which aligns with Piaget's constructivist theory.

Cognitive Theory

Cognitive theory explains the processes of learning and the stages people move through as they acquire knowledge. Piaget described intelligence as behavior being controlled through mental schemas that a person uses to understand their environment (Piaget, 1971). Cognitive theorists believe the "human mind is the processor of data into information, and therefore the creator of knowledge" (Alharbi, 2012, p. 36).

Piaget identified four stages of cognitive development: Sensorimotor (infancy), pre-operational (toddler-early childhood), concrete operational (elementary and early adolescence), and formal operational (adolescence and adulthood) (Piaget, 1971). The cognitive theory guides educators in the cognitive development from infancy to adulthood. This study's focus is on adolescence, and that would fall under formal operational of Piaget's stage of cognitive development. When students enter this stage, they gain the ability to think in an abstract manner by manipulating ideas (Alharbi, 2012). Allowing students to the time to think abstractly and manipulate ideas with the use of technology aligns with formal operational stage of Piaget's cognitive development.

The use of technology and specifically the internet is considered an element of the learning process (Alharbi, 2012). The internet is an educational tool that students have never known life without, as they are digital natives. This alone makes it clear that the internet is an important tool of the educational process. Online learning is an optimal format of learning as the cognitive theory suggests "students are responsible for engaging in the learning process" through exploration and meaning making (Alharbi, 2012, p. 37).

Cognitive Theory of Multimedia Learning

The cognitive theory and the dual-coding theory combined, create the cognitive theory of multimedia learning or CTML (Mayer, 2014). This theory is the foundation for research on the comparison of the traditional setting compared to an online setting for English learners. The internet provides the ability to use the digital platform to provide multiple formats of information at varying levels to increase achievement in the learning process. The foundation of the multimedia learning research hypothesizes that multimedia instructional information that is created has a higher probability of students engaging in discipline-specific meaning making. "The Cognitive Theory of Multimedia Learning is based on three assumptions: the dual-coding theory, the limited-capacity assumption, and the active processing assumption" (Mayer, 2014, p. 43). The dual-coding theory, which is the learning process, has two information processing modalities or channels: verbal and visual. The limited-capacity assumption involves two theories: theory of the working memory and cognitive load theory, which suggest a limit to the information that can be processed at a time. Finally, there is the active processing assumption, which is the process of filtering incoming information by selecting, organizing, and integrating information with already stored information to create a mental model. Each of these assumptions will be described in more detail below.

Dual-Coding Theory

The dual-coding theory was proposed by Paivio (1990) in order to connect both verbal and non-verbal mental processing. In this model, two cognitive subsystems exist: the logogens and imagens. Logogens are words organized hierarchically, like a classification system in science. Imagens are an optical representation of an object, or an image. Paivio (1990) described dual-coding theory:

Human cognition is unique in that it has become specialized for dealing simultaneously

with language and with nonverbal objects and events. Moreover, the language system is

peculiar in that it deals directly with linguistic input and output (in the form of speech or

writing) while at the same time serving a symbolic function with respect to nonverbal

objects, events, and behaviors. Any representational theory must accommodate this dual

functionality. (p. 53)

According to Paivio, recall and recognition are further embedded in memory by presenting

information in both visual and written form. Images and words are processed differently and

through different channels. When information enters the brain through two different channels

(images and words), there are two avenues to retrieve the information. Mental codes are used to

organize incoming information that can be stored (memory) and be retrieved later. In a research

study by Paivio and Csapo (1973), individuals were required to encode words and pictures

verbally, by writing or pronouncing the words. Subjects were shown words and pictures, and the

recall tests following the test show that picture or images have a higher recall rate than words.

When learning another language, increased proficiency results when the words in both languages

are embedded with the picture.

Limited-Capacity Assumption

The limited-capacity assumption is broken into two parts: the theory of the working

memory and the cognitive load theory. Limited capacity is the belief there is a cap on the

quantity of information a person can process at any given time (Mayer, 1997). Mayer (1997)

believed that humans could take in 5–7 chunks of information in working memory at a given

time. Miller (1994) documented that a person can handle between 5–9 pieces of information.

However, if a person combines or chunks information together, they can store more information.

A person is making a mental representation of incoming information so they can make sense of the information as it enters the brain. Mayer also believed that people at the high end of taking information in have higher metacognitive strategies; they can manage limited cognitive resources more efficiently.

Working Memory

Working from the dual coding perspective, Mayer (2014) argued that humans are limited to "the amount of information that can be processed in each channel at one time" (p. 49). When a visual or digital image is presented, a person can only hold a couple of images at any given time in the visual channel of working memory. Baddeley's (1992) model of working memory stated:

> The term working memory refers to a brain system that provides temporary storage and manipulation of the information necessary for such complex cognitive tasks as language comprehension, learning, and reasoning. This definition has evolved from the concept of a unitary short-term memory system. Working memory has been found to require the simultaneous storage and processing of information. It can be divided into the following three subcomponents: (i) the central executive, which is assumed to be an attentional-controlling system, is important in skills such as chess playing and is particularly susceptible to the effects of Alzheimer's disease; and two slave systems, namely (ii) the visuospatial sketch pad, which manipulates visual images and (iii) the phonological loop, which stores and rehearses speech-based information and is necessary for the acquisition of both native and second-language vocabulary. (p. 556)

Working memory has a capacity limit and is a temporary storage for incoming information. The phonological loop of the working memory is necessary for second language acquisition.

Cognitive Load Theory

According to the cognitive load theory, there is limited space in short-term memory, the learning process should be created in a way that decreases the load to allow schema to be acquired (Heick, n.d.). George Miller's theory of information processing tells us that a maximum capacity exists for load. Therefore, if the working memory load can be decreased, and the schema in long-term memory can be accessed, learning acquisition can occur more effectively. Schemas are cognitive structures that make up a knowledge base (Chandler & Sweller, 1991). Schemas are acquired over a lifetime of learning, and schemas may have schemas contained within them. "Cognitive load theory is based on a number of theories about how human brains process and store information" (Gerjets et al., 2008, p. 44). According to these theories, memory has two parts: working memory and long-term memory. Schema are stored in long-term memory. New information is processed and results in 'cognitive load' on the working memory. The increased cognitive load can affect learning outcomes (Baddeley, 1992). "Cognitive load theory concludes that working memory capacity can be effectively increased, and learning improved, by using a dual-mode presentation" (Baddeley, 1992, p. 557). Cognitive load theory is applied to instructional design of cognitively complex material and is currently being applied in language-based discursive areas. Chandler and Sweller (1991) stated that effective instruction is important:

> One example of ineffective instruction occurs if learners unnecessarily are required to mentally integrate disparate sources of mutually referring information such as separate text and diagrams. Such split-source information may generate a heavy cognitive load because material must be mentally integrated before learning can commence. (p. 293).

Mayer (2014) proposed five principles with which to reduce load capacity and those principles will be discussed in the following pages.

 Active Processing Assumption. The active processing assumption says that people do not learn solely by passively absorbing information (Mayer, 2001). People need to engage in active cognitive processes. Learning is an active process. It is comprised of collecting, organizing, and integrating new information together). Students apply cognitive processes to incoming information; these processes are used to make sense of the information, and to create a coherent mental picture of the information (Mayer, 2014). The cognitive theory of multimedia learning argues against the knowledge being transferred from the teacher to the student (teacher-centered), but suggests that a student-centered approach of knowledge is being created. Students need to combine works and pictures into new information to be stored as schema in long-term memory. The cognitive theory of multimedia learning functions on multiple principles, which are discussed below.

 Modality Principle. The modality principle is presenting words verbally opposed to visually on a screen (Clark & Mayer, 2011). "The capacity limitations of working memory of students are severely impacted when new information is being learned" (Low & Sweller, 2005, p. 147). Information should be presented in a manner that decreases working memory to increase the amount of information that can be processed. The modality principle suggests that words should be presented as narrated speech, rather than visually on a screen (Clark & Mayer, 2011). Students learn more efficiently when new information is shared orally than visually on a screen, especially when there is a level of complexity to the image or model, and the lesson is fast paced. The modality principle is most important when the lesson is a high level of complexity for the student (Tindal-Ford et al., 1997).

Evidence supports this theory; when students are given both visual and auditory instruction, students create a better understanding of the content than students who are only given either visual or auditory instruction (Mayer, 2001). In a study by Moreno and Mayer (1999), a group of students were studying lightning formation, and students were divided into two groups. Students in one group viewed an animation of the process of lightning formation with a narration while watching the animation. The second group watched the same animation with on-screen text information of the process. Students in both groups were given the same retention test. The students in the group with the narration performed significantly higher on the retention test than the group with the on-screen text.

Research also suggests that high performing students are less likely to express the modality principle (Mayer, 1997). Students with less academic experience would benefit from information presented verbally. This mode allows students to lower their working memory capacity. It lowers their working capacity because they lack a mental model of the new information being presented. Students with less academic experience would benefit the most from having more academic resources available to them. The modality principle is important in this study to recognize the best way words should be given to students through instructional strategies to decrease working load for ELL students.

Redundancy Principle. The redundancy principle states that students retain information at a deeper level with animation and voice overlay (Hoffman, 2006). When visual on-screen text is added to the animation with the narration simultaneously, this becomes redundant. Eliminating redundant information or removing identical information in the same learning channel allows students to learn more easily. When students see and hear the same verbal information, they are unable to focus, and this leads to increased memory capacity. Students are

unable to focus because the animation and the on-screen text are both visual, so they are competing for working capacity, which prevents the student from absorbing the information as a double benefit from two different methods (Mayer, 2001). If the same auditory information is shared on two different mediums, the redundancy principle is still in effect. The redundancy principle is important in this study to recognize the best way to provide content in a way that reduces the working load for ELL students.

Contiguity Principle. The spatial contiguity principle suggests educators should place text or captions near the graphic that is being described (Clark & Mayer, 2011). This minimizes the cognitive effort students exert to connect the text with the images. Students do not need to scan the screen to connect the information, and students can exert their cognitive efforts on integration and connection building to create schema (Davis & Norman, 2016). Ways to address spatial contiguity: First, place text close to a graphic that is being described. Have students read text before presenting an animated graphic. Place directions on the same screen as the lesson that is being viewed. Lastly, write feedback close to the questions or answers to which it refers for the student.

The temporal contiguity principle states that narration and animation should occur simultaneously. For example, students should not view an animation and then the narration occur explaining the animation (Clark & Mayer, 2011; Davis & Norman, 2016). The best way to address temporal contiguity is to play narration and animation simultaneously for the students. Several studies support the contiguity principle. Moreno and Mayer (1999) reported that students in one group were given a narration separate from an animation, and students in a second group were presented with a narration simultaneously with an animation. The students that were provided the narration simultaneously with the animation retained more information as seen on

the retention test than the students that heard the narration separate from seeing the animation. Moreno and Mayer reported students learn better when text and animations were placed next to each other on a graphic rather than far apart from one another. The contiguity principle is important in this study to recognize the best way to place text nearer to the graphic to decrease working load for ELL students.

Coherence Principle. The coherence principle suggests, "People learn better when extraneous material is excluded rather than included" (Mayer, 2009, p. 89). All extraneous processing should be eliminated. Information should not be put in multimedia presentations that is not going to be tested or relevant to the learning objective. This distracts from the overall learning goals or targets. Interesting but irrelevant information that might also be included in a multimedia presentation, seductive details, should be excluded as well. There are three coherence principles that instructional designers should follow: first, avoid e-lessons with unnecessary audio or sound; second, avoid e-lessons with unnecessary graphics; and third, avoid e-lessons with unnecessary words (Clark & Mayer, 2011).

A variety of studies support the coherence principle. Harp and Mayer (1998) completed a study using a lesson on lightning strikes. They added an unnecessary effect of lightning strikes on airplanes for a group of students. It was found in the study that students that learned the lesson solely on lightning strikes performed better on the retention test than the students that had the added effect of airplane lightning strikes. Harp and Mayer concluded that irrelevant pictures and text captions could interrupt learning through distraction, seduction, and disruption. The coherence principle is important in this study to recognize the importance of removing extraneous details to increase retention in working load for ELL students.

Connectivism Theory

Connectivism theory is a learning theory that helps us understand a new method of learning, learning that takes place over the internet and information is shared over the internet with others (Downes, 2010; Siemens, 2005). The theory suggests students should combine thoughts, theories and information as well as accept that technology is an integral factor in the learning process. Internet technologies include any tool that allows the user to learn and share content with other people. In connectivism, "the starting point for learning occurs when knowledge is acquired through the process of a student connecting to and providing content knowledge into an online learning community" (Kop & Hill, 2008, p. 2). The idea of networks is that people, or nodes can be connected to create an integrated whole (Siemens, 2005). In the Connectivism Theory students are the nodes in a network, when we make connections, we learn. When nodes connect the theory is learning is occurring. Technology is changing how and where we learn when connecting nodes.

Connectivists do not agree with traditional methods of learning, or the teacher-centered approach (Siemens, 2005). Siemens believes a teacher-centered approach is about the institution and not about the learner. Connectivists believe "students learn best when they experience the world and discover knowledge through the world they live in" (Alharbi, 2012, p. 36). The internet has simplified exploring the world and accessing knowledge. It is important that the educational community validate the importance of technology in the learning process. Current students are digital natives; they do not know a world without technology as a main resource for information. Students learn and work in networked communities using a variety of digital tools (Siemens, 2005). The use of these tools improves students' learning capabilities and develops independent learners.

Second Language Acquisition Theory

Of equal importance to the theories surrounding technology and the learning process are the theories behind second language acquisition (SLA) as they pertain to technology and how it increases English Language Learner's (ELL) learning comprehension (Diallo, 2014). Krashen's theory of second language acquisition theory has five hypotheses: the acquisition-learning theory hypothesis, the monitor hypothesis, the input hypothesis, affective filter hypothesis, and finally the natural order hypothesis (focusing on the order of morpheme acquisition in SLA).

In the acquisition-learning hypothesis, there are two stems of second language: the acquired system and the learned system (Krashen, 1982). The acquired system is a subconscious process that requires strong interaction in the second language. The acquired system also requires the interaction to be slightly above the ELL's knowledge level. "The learned system is the process of formal instruction and is a conscious process" (Krashen, 1982, p. 11). An example of the learned system is sitting in a classroom and learning grammar, rules, and sentence structure from a teacher.

In the monitor hypothesis, Krashen (1982) believed that second language learners have a psychological monitor they use to refine their language. The student would use the skills from what has been learned to modify what knowledge has been acquired. The monitor system cleans up the language.

The input hypothesis explains how language is acquired (Krashen, 1982). When a student is exposed to comprehensible information through listening and reading that exceeds the student's current level of understanding, the student acquires language. The comprehensible information cannot exceed the knowledge level at a high degree, or frustration occurs and language acquisition diminishes.

The affective filter hypothesis explains the emotions of an individual's impact as either positive or negative in the acquisition of language (Krashen, 1982). If the learner's affective filter permits a high level of motivation, confidence, and low levels of anxiety, language acquisition is increased. However, if a student has low motivation, is bored, has low confidence and high anxiety, the learning acquisition process is decreased. Krashen (1982) described a low affective filter as high language acquisition, and a high affective filter as low language acquisition. Students working with high motivation and low anxiety are working in a low affective filter, which in turn promotes more language acquisition.

Krashen (1982) explained "the affective filter captures the relationship between affective variables and the process of second language acquisition by positing that acquirers vary with respect to the strength or level of their Affective Filters" (p. 31). According to Krashen, if comprehensible input is constantly received, the student learns to understand and speak the second language (L2). He also stated that learning must take place in a low affective filter environment; a low affective environment is one that has high motivation and high engagement. A high affective environment would be characterized with boredom or anxiety, which prevent language acquisition. Technology-based instruction provides consistent comprehensive input within a low affective filter. The incorporation of technology increases motivation and engagement for student learning (Diallo, 2014). Most students enjoy the opportunity to use technology to learn, and this excitement motivates them to learn.

Krashen (2000) explained how the student's mother tongue plays a vital role in SLA. A strong first language (L1) in the domains of "listening, speaking, reading and writing lays the foundation for transfer of these skills to the L2" (Malone, 2012, p. 6). Thomas and Collier (1997) confirmed Krashen and Cummins' prediction with a longitudinal study of over 42,000 students

in bilingual programs. This longitudinal study reviewed ELL students in five districts across the nation from 1985-2001. The achievement findings were based on nationally standardized tests. Their findings stated that the biggest predictor of success in end-of high school exams in their second language by ELLs was the number of years they had of education in their first language (Thomas & Collier, 1997). The strength of a student's education in their primary language or mother tongue generally predicts their educational successes.

ELL students' levels of reading, writing, and oral proficiency are indicative of their academic success in the L2 (Krashen, 1982). Limited English proficiency leads to poor academic achievement and would decrease academic success (Echevarria et al., 2013). To increase the success of ELL students, high quality literacy instruction that observes the natural order of learning is required (Krashen, 1982). Echevarria et al. (2013) developed the sheltered instruction observation protocol model (SIOP) to help make content more comprehensible for ELL students. "The SIOP consists of these eight key components: lesson preparation, building background, comprehensible input, strategies, interaction, practice/application, lesson delivery, and review and assessment (Kareva & Echevarria, 2013, p. 240–242). SIOP intertwines with Krashen's (1982) comprehensive input theory. Key components for SIOP teaching are first getting students to use learning strategies such as predicting and paraphrasing (Kareva & Echevarria, 2013). The second focus is scaffolding, which requires taking a large amount of information and breaking it into digestible pieces for a gradual release of information. The third key to SIOP is teaching higher order thinking skills (HOTS) and includes the idea of helping learners move from unconsciously incompetent to consciously competent. Differentiation of instruction takes place at all three key components of SIOP. The use of technology to differentiate and scaffold lessons would provide engaging, hands-on, and innovative comprehensive input (Diallo, 2014).

Using technology to differentiate instruction improves ELL engagement in class, which in turn tends to produce a low affective filter and allows students to take ownership of the learning process (Echevarria et al., 2013). The use of technology also allows ELL students to have access to the most up-to-date information regarding culturally sensitive information. Immigration and the existence of undocumented students and their families lead to fears and anxiety that can be addressed by teachers (Lickona, 1991). The increase of anxiety creates a high affective filter, according to Krashen (1982).This can take away from the learning opportunity of the L2, as anxiety moves a student into a high affective filter where language acquisition is decreased (Echevarria et al. 2013).

Summary of Theory Frameworks

In the review of several different framework theories, some theories are more relevant than others to this study. The most relevant theories are the cognitive theory, the constructivist theory, the cognitive theory of multimedia learning, the connectivism theory, the second language acquisition theory, and the SIOP model.

Cognitive theory explains the processes of learning and the stages people move through as they acquire knowledge. The cognitive theory also explains the four developmental stages of learning. Cognitive theorists believe the human mind processes data into information, which is the creation of new knowledge; therefore, the mind is where knowledge is formed (Huitt & Hummel, 2003).

According to the constructivist theory, Piaget believed knowledge originates within the learner, and Piaget had four principles of active learning (Piaget, 1971). In a traditional classroom setting, Piaget suggested if the teacher is doing all the talking, and the learner is

primarily listening, the communication between the teacher and the learner would not be mutual. The learner needs to be engaged and actively a part of the learning process.

The cognitive theory of multimedia learning is important in understanding how the use of a digital platform increases student educational outcomes. This theory is developed from the cognitive theory and the dual-coding theory. The foundation of the multimedia learning research hypothesizes that developing information presentation through multimedia instructional tools tends to increase the level of engagement and meaning making for students (Mayer, 2014). The use of technology incorporates the dual-coding theory of using both audio and visual instruction in the learning process. This allows the student to access learning content more effectively and makes the cognitive theory of multimedia learning an important theory to explain the value of online, blended, and distance learning.

In the connectivism theory, "the starting point for learning occurs when knowledge is acquired through the process of a student connecting to and providing content knowledge into an online learning community" (Kop & Hill, 2008, p. 2). Connectivism theory is a learning theory for the age of technology and the internet. Connectivists disagree with a teacher-centered classroom, but believe in student-centered learning (Kopp & Hill, 2008). This theory supports the movement towards online, blended, and distance learning.

The acquisition-learning hypothesis has two systems: the naturally acquired and the learned (Krashen, 1982). The acquired occurs subconsciously and requires meaningful interaction in the target language (Krashen, 1982). This theory supports the learning process of English Language Learners which is a focal point of this study.

The sheltered instruction observation protocol model (SIOP) was developed to help make content more comprehensible for ELL students. According to the second language acquisition

theory, if the content is comprehensible, student learning increases (Kareva & Echevarria, 2013). The implementation of the SIOP model is important in working with ELLs, which is another focal point of this study

The other theories that were referenced in this section are incorporated into the theory that frames this study. The cognitive theory and the dual-coding theory are what make up the cognitive theory of multimedia learning. The learner-centered approach would be used when looking at learning management systems for online and distance learning. The constructivist theory informs the understanding of the second language acquisition theory. It helps in the understanding of how students learn. Finally, the cognitive load theory connects with the cognitive theory of multimedia learning in understanding the capacity of the brain during the learning process.

Summary

This chapter reviewed the instructional methods of online, blended, and traditional learning. Research on the impact of technology used for instructional purposes and the implementations of blended and online courses was provided. Background and research information was provided for standardized testing, specifically the SAT and WIDA test that were used for this study. A framework of theories was heavily researched and shared. The most relevant theories for this study are the cognitive theory of multimedia learning, the connectivism theory, the second language acquisition theory, and the SIOP model used for ELLs.

CHAPTER 3

RESEARCH METHODOLOGY

The increase in immigration of ELLs and the changing landscape of education with marked improvements in access to technology and the internet over the past 30 years, have changed the way learning occurs in the classroom. This chapter focused on the methodology of determining the effects of traditional instruction, blended instruction, and online instruction on English language learner achievement on the evidence-based reading and writing SAT scores, and if WIDA proficiency level affects SAT scores. This was a quantitative study that used a one-way factorial analysis of variance (ANOVA), a two-way factorial analysis of variance (ANOVA), a *t*-test, and a simple linear regression to measure the potential relationship. The population studied was high school juniors from the class of 2019 in the state of Michigan. A more in-depth description of the research design, data analysis procedures and collection, and variables to be studied are outlined below.

Design of Research

The purpose of this quantitative research was to determine the effects of traditional instruction, blended instruction, and online instruction on English language learner achievement, and if WIDA proficiency level impacts SAT scores. The evidence-based reading and writing SAT score was compared to WIDA proficiency level and type of instruction (traditional, blended, online). This study:

- Compared the mean evidence-based reading and writing SAT scores in the three instructional methods groups (online, blended, traditional) among ELL high school students from the state of Michigan.

- Compared the mean evidence-based reading and writing scores of high school male and female ELL students in Michigan.

- Identified if an interaction exists between instructional type and gender among ELL high school students from the state of Michigan.

- Compared the mean evidence-based reading and writing SAT scores of high school ELL students to high school non-ELL students in Michigan.

- Compared the effects of traditional instruction, blended instruction, and online instruction on ELL achievement on the evidence-based reading and writing SAT scores, and if WIDA proficiency level affects the success.

The high school junior students selected to participate in this study are all represented in the Michigan Department of Education database. The demographic information, research design, data collection, and data analysis are outlined below.

Methodology

Quantitative research is "collecting numerical data to explain a specific phenomenon" (Muijs, 2011, p. 2). In quantitative research, relationships between independent and dependent variables are identified within a population (Field, 2013). "Statistical methods are used to collect, analyze, and interpret data, and relationships in data" (Hoare & Hoe, 2013, p. 2). Quantitative research design is chosen when associations can numerically be measured, and the data are measured through appropriate statistical analysis.

In this study, the data on students who are ELL and non-ELL in their junior year during the 2017–18 school year (consisting of evidence-based reading and writing SAT scores, gender, WIDA proficiency) in the state of Michigan and their instructional methods (online, blended, traditional) in Michigan public and charter schools were collected through the Michigan Education Research Institute (MERI). A one-way factorial analysis of variance (ANOVA) was used to identify if ELL students scored significantly different on the evidence-base reading and writing portions of the SAT based on mode of instruction (online, blended, traditional). A two-way factorial analysis of variance (ANOVA) was used to identify if the ELL student score on the SAT significantly differed based on type of instruction (online, blended, traditional), and identified if the ELL student score on the SAT significantly differed based on gender (male, female). The two-way factorial ANOVA identified if there was an interaction between modes of instruction (online, blended, traditional) and gender for ELL students on the evidence-based reading and writing portions of the SAT. A t-test was used to identify if there was a difference on the evidence-based reading and writing SAT scores between ELL and non-ELL students. A simple linear regression was used to identify if a predictive relationship exists between student success on the evidence-based reading and writing portions of the SAT and each mode of instruction (online, blended, traditional).

Research Questions

This study investigated which factors impact the education of ELL students in a learning environment by addressing the following questions:

1. Is there a significant difference across instructional types (online, blended, traditional) on the evidence-based reading and writing portions of the SAT for ELL students?

2. Is there a significant difference based on gender (male, female) on the evidence-based reading and writing portions of the SAT for ELL students?

3. Is there a significant interaction between instructional types (online, blended, traditional) and gender for ELL students on the evidence-based reading and writing portions of the SAT?

4. Is there a significant difference on the evidence-based reading and writing portions of the SAT between ELL and non-ELL students?

5. Are WIDA scores predictive of student success on the evidence-based reading and writing portions of the SAT for the three modes of instruction (online, blended, traditional)?

Null Hypotheses

$H_0$1. There is no statistically significant difference across instructional types (online, blended, traditional) on the evidence-based reading and writing portions of the SAT for ELL students.

$H_0$2. There is no statistically significant difference based on gender (male, female) on the evidence-based reading and writing portions of the SAT for ELL students.

$H_0$3. There is no statistically significant interaction between instructional types (online, blended, traditional) and gender (male, female) for ELL students on the evidence-based reading and writing portions of the SAT.

$H_0$4. There is no statistically significant difference on the evidence-based reading and writing portions of the SAT between ELL and non-ELL students.

$H_0$5. There is no predictive relationship between WIDA proficiency scores and student success on the evidence-based reading and writing portions of the SAT for the three modes of instruction (online, blended, traditional).

Population and Sample

The population studied was high school juniors in the state of Michigan that attended a public or charter school during the 2017–2018 school year. Michigan has 1,701 public high schools and 300 charter schools. The Michigan Education Research Institute (Michigan Education Research Institute [MERI], n.d.) provided the data on the population. School populations were divided based on instructional practices (online, blended, traditional), ELL versus non-ELL, and female ELL versus male ELL students. In SAT testing for the 2017–2018 school year, 40,735 non-ELL students were tested, and 3,641 ELL students were tested. The sample studied was comprised of ELL students and non-ELL students that were juniors in the 2017–2018 school year.

Recruitment

Data for participants were gathered from the University of Michigan's Michigan Education Data Center (MERI, n.d.). A research application to Michigan Education Research Institute was completed upon the completion of defending the proposal for this study, approval of the dissertation committee, and approval of the Indiana State University's Office of Sponsored Programs Internal Review Board (IRB). Once the notification of approval was received from the IRB, a completed online application for MERI was submitted. Information to be requested from MERI was English Language Learner individual student evidenced-based reading and writing SAT data (2017–2018 school year), WIDA proficiency data from the 2017–2018 school year, gender, and school attended to identify instructional methods (online, blended, traditional).

The following information was included in the application:

- A letter of introduction that included a general overview of the of the study, the purpose of the study, a statement regarding FERPA exceptions and how the study meets the exceptions, a statement of how the data would be used to address the research question, the researcher's name, faculty sponsor's name, and contact information.

- FERPA training certification was submitted.

- Confidentiality and security forms were signed for all research team members (committee chair) and submitted.

  - An informed consent document, which contained: The purpose of the study (improve instruction and FERPA exceptions), the disclosing educational entity enters into a written agreement with the organization, the study does not permit identification of individual students by anyone other than representatives of the organization with legitimate interests in the information, the information is destroyed when no longer needed for the study purposes.

Once a written agreement was received from MERI, and data were received from MERI, data analysis began.

An email with a survey was sent to all non-virtual public and charter schools in Michigan to identify if the school's junior class were one-to-one with technology during the 2017–18 school year. This identified which schools were considered blended and which were considered traditional. This was a data set the state of Michigan does not track.

Instrumentation

Two primary instruments were used in this study: the evidence-based reading and writing portions of the SAT (scholastic aptitude test), and the WIDA test (ACCESS for ELLs). In this

study the data were used to see if a relationship exists between evidence-based reading and writing SAT score, instructional method, and WIDA proficiency. The evidence-based reading and writing section on the SAT scores range between 200 and 800 (The Princeton Review, n.d.). The college and career ready standard on the evidence-based reading and writing portions of the SAT for the state of Michigan is a 480 (MERI, n.d.).

The reading portion of the SAT test has a total of 52 questions that must be answered in 65 minutes; this is made up of four single reading passages and a pair of passages (The Princeton Review, n.d.). All questions are multiple choice with four possible answers. The writing and language section of the SAT tests a student's knowledge of grammar, meaning, and word-usage. Testers would proofread four passages and find errors to make the appropriate corrections. The student has 35 minutes to take the test and it is comprised of 44 questions.

The WIDA (World-Class Instructional Design and Assessment) test (ACCESS for ELLs) is administered to all students identified as ELLs in grades K–12 across the United States (WIDA, 2014). It measures the WIDA standards and is given annually to assess student's language proficiency progress. WIDA testing meets the U.S. federal requirements of Every Student Succeeds Act (ESSA) for monitoring and reporting ELL progress in English language proficiency (WIDA, n.d., 2014). ACCESS assesses the following four domains: reading, writing, listening, and speaking of the English language (WIDA, n.d.). The four domains are tested (reading, writing, listening, and speaking), and the student receives a proficiency score of a 1 through 6. Each domain score is averaged to produce a composite score of a proficiency level of 1 through 6. A score of 1 indicates a student that is new to the language, and a 6 suggests that the student is proficient in the language.

SAT Validity and Reliability

The SAT college readiness test is a required test for juniors in the state of Michigan. This instrument was chosen as a measurement in this study for multiple reasons. The SAT is a standardized test, it is measured on all juniors in the state, and reliability and validity studies support the standardization of the test (Westrick et al., 2019).

The SAT was redesigned in 2016. A validity research study was completed in 2019, and it was based on 223,000 students across 171 colleges and universities (Westrick et al., 2019). The results show that the SAT scores are strongly predictive of college performance. This study was not determining college preparedness, but looking for relationships between instructional methods and WIDA proficiency levels of ELL students. The SAT is the standardized instrument used as a dependent variable to show a potential relationship.

WIDA Testing (ACCESS) Validity and Reliability

The test utilized to measure WIDA standards is the ACCESS for ELLs, or commonly referred to as ACCESS. ACCESS is given annually to measure proficiency and growth in four domains: reading, writing, listening, and speaking (WIDA, n.d.). ACCESS scale ranges from 100 to 600. Students that score a 230 are a WIDA proficiency level 2.3. The reliability of the online ACCESS test from 2017 data ranged from .937 to .957 from grades 1 through 12 (Center for Applied Linguistics: Language Assessment Division, 2018). The reliability and validity of the ACCESS test is high for the measurement of the WIDA standards.

<div align="center">Data Collection Procedures</div>

The University of Michigan's Michigan Education Research Institute provided student data from the Michigan Education Data Center. They provided the following data for all students that were juniors in 2017–2018:

- Gender of ELL and non-ELL students

- ELL/non-ELL

- Evidence-based reading and writing SAT scores

- Composite WIDA proficiency scores for ELL students

- School attended during the 2017–2018 school year

- Identified virtual schools during the 2017–18 school year

Data were also collected from public and charter high schools in the state of Michigan from a survey. The survey was used to identify if the junior classes were one-to-one with technology during the 2017-18 school year. The Qualtrics survey was emailed out to every building administrator of a public or charter high school.

Data Analysis

A report was compiled with descriptive information from the sample population including number of participants, number of public schools, number of charter schools, number of virtual schools, number of ELL students, number of non-ELL students, and number of male and female ELL students. Descriptive data were shared to provide the percentages of ELL students that received online instruction, blended instruction, and traditional instruction. It also included non-ELL students and the percentages that were male and female. A descriptive analysis of data for all independent and dependent variables was conducted using SPSS, a statistical analysis software. The descriptive data for this study included type of instruction (online, blended, traditional), type of student (ELL, non-ELL), gender (male, female) of ELL students, WIDA proficiency scores, and evidence-based reading and writing SAT scores. The means, standard deviations, and range of scores for the variables were examined and presented.

The following research questions were answered in this study:

Research Question 1. Is there a significant difference across instructional types (online, blended, traditional) on the evidence-based reading and writing portions of the SAT for ELL students? A one-way factorial ANOVA was conducted to identify if there is a difference in SAT scores based on type of instruction (online, blended, traditional) for ELL students. The type of instruction (online, blended, traditional) was compared to the type of student (ELL, non-ELL). If significant, then post hoc tests were run. The dependent variable is the evidence-based reading and writing SAT scores.

Research Question 2. Is there a significant difference across gender (male, female) on the evidence-based reading and writing portions of the SAT for ELL students? An independent samples *t*-test was conducted to identify if there is a significant difference in SAT scores based on gender (male, female) of ELL students. An alpha level of .05 would be used to ascertain differences in evidenced based reading and writing SAT scores of male and female ELL students.

Research Question 3. Is there a significant interaction between instructional types (online, blended, traditional) and gender (male, female) for ELL students on the evidence-based reading and writing portions of the SAT? A two-way factorial ANOVA was conducted to reveal if there is an interaction between type of instruction (online, blended, traditional) and gender of student (male, female). If the interaction is significant, the interaction would be differentiated using tests of simple main effects. The two factors of type of instruction (online, blended, traditional) and the gender of student (male, female) were separated in the two-way ANOVA in terms of the evidence-based reading and writing SAT scores. If significant, then post hoc tests were run. The dependent variable was the evidence-based reading and writing SAT scores.

Research Question 4. Is there a significant difference on the evidence-based reading and writing portions of the SAT between ELL and non-ELL students? The purpose of this question is to identify if non-ELL students score significantly higher or lower compared to ELL students. An independent samples *t*-test was used to identify if a difference exists between the two independent sample groups.

Research Question 5. Are WIDA proficiency scores predictive of student success on the evidence-based reading and writing portions of the SAT for the three modes of instruction (online, blended, traditional)? Three simple linear regressions were conducted to reveal if there was a predictive relationship between type of instruction (online, blended, traditional) and WIDA proficiency scores in respect to the evidence-based reading and writing scores on the SAT. The dependent variable is the evidence-based reading and writing SAT scores.

Summary

The methodology chapter describes the statistical model to identify if a relationship exists between ELL student SAT scores on the evidence-based reading and writing sections and type of instruction (online, blended, traditional). A one-way factorial ANOVA identified if a difference in mode of instruction (online, blended, traditional) impacts evidence-based reading and writing SAT scores. An independent samples *t*-test was used to identify a difference in SAT scores based on gender (male, female). A two-way factorial ANOVA was used to identify if an interaction exists between instructional type and gender for ELL students on the SAT. An independent samples *t*-test was used to identify if a difference in SAT scores exists between ELL and non-ELL students. Three simple linear regressions were used to identify if WIDA proficiency scores are predictive of student success on the SAT for the three modes of instruction (online, blended, traditional).

This chapter described the research design, the research questions, hypotheses, explains the data collection process, the recruitment of population and sample size, the instrumentation used, and the reliability and validity of the instrumentation. This study will help practitioners understand the best use of instructional methods for ELL students based on their WIDA proficiency levels. It will also help practitioners understand ELL supports needed if a specific instructional method (online, blended, traditional) is not possible.

CHAPTER 4

DATA ANALYSIS

This study was a quantitative analysis of high school ELL student and non-ELL student-level data to determine if a difference exists between mode of instruction (traditional, blended, online) and evidence-based reading and writing scores of ELL students. It compared ELL student achievement to non-ELL student achievement on evidence-based reading and writing SAT scores. The study identified if an interaction between gender and mode of instruction exists and if WIDA scores can predict evidence-based reading and writing SAT scores based on mode of instruction. High school juniors in the state of Michigan during the 2017–18 school year was the focus population. The data were obtained through Michigan Education Research Institute (MERI), the University of Michigan's research database. A Qualtrics survey was sent to all secondary administrators in the state of Michigan to identify if their juniors were one-to-one with technology for the 2017–18 school year. The 110 school districts that replied were used in the study. The 51 districts that were one-to-one identified as using a blended mode of instruction. The 59 districts that were not one-to-one identified as using a traditional mode of instruction. MERI data identified districts that used an online mode of instruction.

Student-level data were received and downloaded in a secure database from MERI; once received, an Excel spreadsheet was made of the categories to be studied. Next, Qualtrics data that were received from the survey of schools was put in a spreadsheet. This spreadsheet identified the school districts that were used in the study. If the district responded with a "yes" for one-to-

one, they were categorized as using a blended mode of instruction. If the district responded with

a "no" for one-to-one, they were categorized as using a traditional mode of instruction. Data

from SPSS output were analyzed for statistical significance of variables. Descriptive statistical

information was useful to identify range, mean, and standard deviation. These results were

compared to identify if significant differences were apparent. After reporting the descriptive

statistical information, inferential statistical information was analyzed and reported. The

statistical tests used in this study are one-way ANOVA, independent samples *t*-test, two-way

ANOVA, and a linear regression. The research questions are as follows:

1. Is there a significant difference across instructional types (online, blended, traditional) on

   the evidence-based reading and writing portions of the SAT for ELL students?

2. Is there a significant difference based on gender (male, female) on the evidence-based

   reading and writing portions of the SAT for ELL students?

3. Is there a significant interaction between instructional types (online, blended, traditional)

   and gender for ELL students on the evidence-based reading and writing portions of the

   SAT?

4. Is there a significant difference on the evidence-based reading and writing portions of the

   SAT between ELL and non-ELL students?

5. Are WIDA scores predictive of student success on the evidence-based reading and

   writing portions of the SAT for the three modes of instruction (online, blended,

   traditional)?

Descriptive Statistics

Student data accounted for 4,221 ELL students that were analyzed in the state of

Michigan; of those, 3,810 (90%) were ELL students that were identified as using a traditional

mode of learning, 37 (.01%) were ELL students identified as using an online mode of learning, and 374 (.09%) were ELL students identified as using blended learning. ELL and non-ELL students consisted of 104,223 total students whose test data were part of this analysis, 100,002 (97%) were non-ELL, and 4,221 (3%) were ELL students. The ELL gender was 1,937 (46%) female, and 2,284 (54%) male. The Qualtrics survey reported: 51 schools that were one-to-one with technology (blended), and 59 schools reported back that they were not one-to-one with technology (traditional).

ELL Participants

The gender, mode of instruction, population (N) tested, mean (M), and standard deviation (SD) for ELL students are displayed in Table 1.

Table 1

ELL Participant Breakdown

Gender	Mode	N	M	SD
Female	Online	20	424.00	70.22
	Blended	182	420.93	56.50
	Traditional	1735	424.47	59.74
Male	Online	17	388.82	35.16
	Blended	192	424.37	68.13
	Traditional	2075	417.28	59.98

Research Question 1

Is there a significant difference across instructional types (online, blended, traditional) on the evidence-based reading and writing portions of the SAT for ELL students? A one-way ANOVA was used to answer this question. A one-way ANOVA is a statistical analysis used to find statistical differences between two or more independent groups. In this analysis the researcher compared the dependent variable of evidence-based reading and writing SAT scores

of ELL students to the independent variable mode of instruction (online, blended, traditional).

The evidence-based reading and writing SAT score was an ordinal data point with a score

between 200–800. The college and career readiness standard for the state of Michigan is 480.

Mode of instruction was a categorical data point that was provided nominal categories (1-

traditional, 2-online, 3-blended).

A one-way ANOVA was conducted to determine if evidence-based reading and writing

scores on the SAT were different for ELL students based on mode of instruction (online,

blended, traditional). ELL students were classified into three groups: online (n = 37), blended (n

= 374), and traditional (n = 3,810). Assumptions tests were analyzed, and outliers existed, as

assessed by the inspection of a boxplot; therefore, the data were reported with the mean and the

trimmed mean for Levene's Statistic. The trimmed mean accounts for outliers in the data. The

mean (M) was .57 and the trimmed mean (M) was .41. Outliers were kept in the analysis because

it is believed the result would not be materially affected as noted by the mean and trimmed mean

value; data were normally distributed for each group, as assessed by the Q-Q plots, and

homogeneity of variances was met, as assessed by Levene's test of homogeneity of variances (p

= .567).

The test results revealed evidence-based reading and writing scores on the SAT increased

from online (M = 407.84, SD = 58.89), to traditional (M = 420.55, SD = 60.00), to blended (M =

422.70, SD = 62.68) in that order, but the differences between these modes of instruction (online,

blended, traditional) were not statistically significant, $F(2,4218) = 1.059$, $p = .347$. The group

means slightly increased, but were not statistically significantly different ($p > .05$). Therefore, I

cannot reject the null hypothesis and I cannot accept the alternative hypothesis.

Table 2 provides descriptive statistics for mode of instruction compared to evidence-based reading and writing SAT scores. The entire sample was analyzed for range, mean, and standard deviation.

Table 2

Descriptive Statistics for Mode of Instruction Compared to Evidence-Based Reading and Writing SAT Scores

Mode	*M*	*SD*	Min.	Max.
Online	407.84	58.89	310	590
Blended	422.70	62.68	270	750
Traditional	420.55	60.00	200	760

After running the one-way ANOVA test for significance on mode of instruction, the results were entered into Table 3, which illustrates the output of the one-way ANOVA used and analyzed to determine the significance of the test. The group means increased slightly but were not statistically significant ($p > .05$).

Table 3

One-Way Analysis of Variance of Modes of Instruction

Source	*df*	*SS*	*MS*	*F*	*p*
Between groups	2	7680.13	3840.07	1.06	.35
Within groups	4218	15288331.0	3624.55		
Total	4220	15296011.1			

Note. $* = p \leq .05$, $*** = p \leq .001$

Figure 2 shows the slight increases of evidence-based reading and writing scores on the SAT based on mode of instruction.

Figure 2

Simple Bar Mean of SAT by Mode
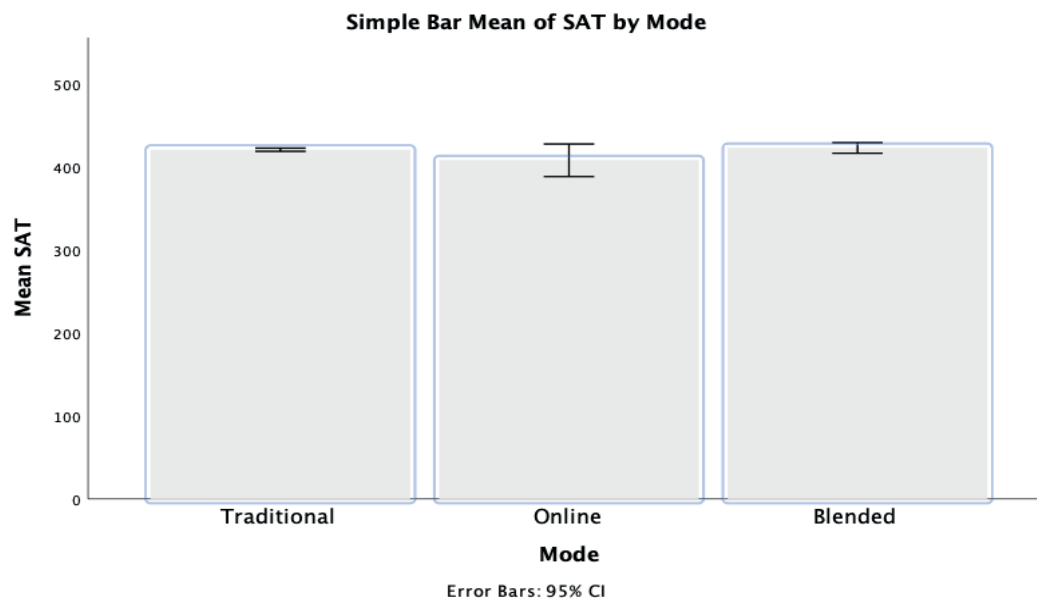
Note. Figure 2 shows a slightly higher SAT score for blended compared to traditional and online mode of instruction. However, this is not a significant difference.

Data Analysis Limitations

Data analysis limitations in research question 1, outliers were identified and kept in the data analysis. Reviewed Levene's Statistic and the mean was .56, and the trimmed mean was .41. The trimmed mean accounted for outliers, and the difference between the mean and trimmed mean of Levene's Statistic was .15, a small difference. Also, there was a cell imbalance as there were 37 online students, 374 blended students and 3,810 traditional students. The one-way ANOVA was a robust test that accounted for cell imbalance (Laerd Statistics, 2017).

Research Question 2

Is there a significant difference based on gender (male, female) on the evidence-based reading and writing portion of the SAT for ELL students? An independent-samples *t*-test was used to determine if differences existed in evidence-based reading and writing scores between male and female ELL students. An independent samples *t*-test was used to determine if a difference existed between the means of two independent groups on a continuous dependent variable. The independent groups in the research question were gender (male, female) and the continuous dependent variable was evidence-based reading and writing SAT scores.

The population sample consisted of 1,937 females and 2,284 males. Assumptions tests were performed, and outliers existed in the data, as assessed by the inspection of a boxplot. The outliers were kept in the analysis because it is believed the result would not be materially affected. Evidence-based reading and writing scores on the SAT for each independent variable level of gender were normally distributed, as assessed by the Q-Q Plots, and homogeneity of variances was met, as assessed by Levene's test for equality of variance ($p = .667$).

Results indicated the evidence-based reading and writing scores were higher for female ELLs (M = 424.24, SD = 59.53), than for male ELLs (M = 417.66, SD = 60.62), a statistically significant difference, M = 6.48, 95% CI [-10.11, -2.83], $t(4219) = 3.49$, $p < .001$. A statistically significant difference was identified in evidence-based reading and writing SAT scores between male and female ELL students, with females scoring higher than males, M = 6.48, 95% CI [-10.11, -2.83], $t(4219) = 3.49$, $p < .001$, d = .11. A statistically significant difference was identified between means ($p < .05$), and therefore I can reject the null hypothesis and accept the alternative hypothesis.

See Table 4 for descriptive statistics on the independent samples *t*-test that was run which determined a statistically significant difference between evidence-based reading and writing SAT scores and gender of ELL students. The impact of effect size is also indicated by Cohen's *d.*

Table 4

Descriptive Statistics on Evidence-Based Reading and Writing SAT Scores Compared to Gender of ELL Students

Gender	*M*	*SD*	*t*(4219)	*p*	Cohen's *d*
Male	417.66	59.53	3.46	<.001***	.11
Female	424.14	60.62	3.46	<.001***	.11

$* = p \leq .05, *** = p \leq .001$

Data Analysis Limitations

One data analysis limitation in research question 2 was outliers were kept in the study, as the independent samples *t*-test is a robust test to account for outliers. The sample size was 1,937 females and 2,284 males for a total sample size of 4,221. Outliers accounted for 45 of a sample of 4,221. It was believed the result would not be materially affected.

Research Question 3

Is there a significant interaction between instructional types (online, blended, traditional) and gender for ELL students on the evidence-based reading and writing portions of the SAT? A two-way ANOVA was used to analyze the effects of gender and mode of instruction (online, blended, traditional) on evidence-based reading and writing SAT scores. A two-way ANOVA is used to determine whether an interaction effect exists between two independent variables on a continuous dependent variable.

A two-way ANOVA was conducted to examine the effects of gender and mode of instruction (online, blended, traditional) on evidence-based reading and writing SAT scores.

Residual analysis was performed to test for the assumptions of the two-way ANOVA. Outliers were assessed by inspection of a boxplot, normality was assessed using Q-Q plots, and homogeneity of variances was assessed by Levene's test. There were outliers found in the data. The outliers were kept in the analysis as the ANOVA is a robust statistical test, and it is believed the result would not be materially affected (Laerd Statistics, 2017). Residuals were normally distributed on the Q-Q plots, and there was homogeneity of variance when the trimmed mean value for homogeneity of variances was used ($p = .06$). The trimmed mean accounts for outliers in the data points, and 45 outliers were identified. The mean value ($p = .04$) for homogeneity of variance showed a violation occurred. The analysis was completed using the trimmed mean ($p = .06$).

An analysis of main effect for mode of instruction was performed, which indicated the main effect was not statistically significant, $F(2,4215) = 1.23$, $p = .293$. No statistically significant main effect exists between gender on evidence-based reading and writing SAT scores, $F(1,4215) = 3.48$, $p = .062$. The interaction effect was tested between gender and mode of instruction (online, blended, traditional) and was found not to be statistically significant, $F(2,4215) = 2.39$, $p = .092$.

Main effect tests were carried out and were not statistically significant. No statistically significant difference in interaction effect exists between gender and mode of instruction. Therefore, simple main effects were not carried out. I cannot reject the null hypothesis and I cannot accept the alternative hypothesis.

See Table 5 for a summary of descriptive statistics on the two-way ANOVA run to determine if interaction existed between gender and mode of instruction.

Table 5

Two-Way ANOVA Summary Table Interaction Between Gender and Mode of Instruction

Source	SS	Df	MS	F	p
Gender	69080.30	1	12568.98	3.48	.062
Mode	8868.26	2	4434.13	1.23	.293
Gender x Mode	17246.94	2	8623.47	2.39	.092
Error	15226930.8	4215	3612.56		

Note. $* = p \leq .05$, $*** = p \leq .001$

Data Analysis Limitations

A data analysis limitation in research question 3 was outliers were kept in the study, as the Levene's Test for Quality of Error Variances test statistic of trimmed means accounts for outliers. The trimmed mean value was $p = .04$. The mean value was $p = .06$. The difference between the two values was slight (.02). Also, a cell imbalance was identified in the following data: 37 online students, 374 blended students and 3,810 traditional students for mode of instruction. The independent variable gender included 1,937 females and 2,284 males. The two-way ANOVA was a robust test and accounted for cell imbalance (Laerd Statistics, 2017).

Research Question 4

Is there a significant difference in scores on the evidence-based reading and writing portions of the SAT between ELL and non-ELL students? An independent-samples *t*-test was used to determine if differences were found in evidence-based reading and writing SAT scores between ELL and non-ELL students. An independent samples *t*-test is an analysis used to determine if a difference exists between the means of two independent groups on a continuous dependent variable. The independent groups in the research question were ELL and non-ELL

students, and the continuous dependent variable was evidence-based reading and writing SAT scores.

An independent-samples t-test was run to determine if a difference existed between ELL and non-ELL student evidence-based reading and writing SAT scores. Levene's Test for Equality of Variance was p = .000, indicating that assumption of homogeneity of variances was violated. Therefore, Levene's Test for Equality of Variance values for equal variances not assumed was used. Outliers were found in the data, as assessed by inspection of boxplot; the outliers were kept in the analysis because it is believed the result would not be materially affected. The population of ELL students was 4,221 and non-ELL students was 100,001. Outliers were 20 as assessed by boxplot. Evidence-based reading and writing SAT scores for ELL and non-ELL students were normally distributed, as assessed by Q-Q plots.

Results indicated the evidence-based reading and writing SAT scores were higher for non-ELL students (M = 509.62, SD = 98.33) than ELL students (M = 420.63, SD = 60.21), a statistically significant difference: M = 88.99, 95% CI [-90,91, -87.07], t(5221.06) = -91.042, p = 000, d = -.92. A statistically significant difference exists between means (p < .05), and therefore I can reject the null hypothesis and accept the alternative hypothesis.

See Table 6 for descriptive statistics on the independent samples t-test run that determined a statistically significant difference was found between evidence-based reading and writing SAT scores and student status (ELL, non-ELL students); the impact of effect size is also indicated by Cohen's d.

Table 6

Descriptive Statistics on Evidence-Based Reading and Writing SAT Scores Compared to ELL and Non-ELL Students

Student	M	SD	t(5221.06)	p	Cohen's d
ELL	420.63	60.21	3.46	.000***	-.92
Non-ELL	509.62	98.33	3.46	.000***	-.92

$* = p \leq .05$, $*** = p \leq .001$

Data Analysis Limitations

A data analysis limitation in research question 4 was outliers were kept in the study, as the independent samples *t*-test is a robust test to account for outliers. The sample size was 4,221 ELL and 100,002 non-ELL students for a total sample size of 104,223. Outliers accounted for 20 of a sample of 104,223; it was believed the result would not be materially affected. Imbalanced cell size and unequal sample size are also limitations. However, the independent samples *t*-test is a robust test to account for these discrepancies (Laerd Statistics, 2017).

Research Question 5

Are WIDA scores predictive of student success on the evidence-based reading and writing portions of the SAT for the three modes of instruction (online, blended, traditional)? A simple linear regression was used to analyze this research question. A simple linear regression is a statistical analysis that assesses the linear relationship between two continuous variables to predict the value of a dependent variable based on the value of the independent variable. It identifies if a linear regression between the variables is statistically significant, how much of the variance is explained in the independent variable, understands the direction and magnitude of the relationship, and predicts values of the dependent variable based on different values of the independent variable. The prediction is done by using the regression formula. Formula: EBRW SAT scores = $b_0 + (b_1 \times$ WIDA score).

A linear regression was run to understand the effect of WIDA scores on evidence-based reading and writing scores on the SAT when controlling for mode of instruction (online, blended,

traditional). Assumptions were checked: assessing linearity and a scatterplot of evidence-based reading and writing scores against WIDA scores was inspected. Visual inspection of scatterplot indicated a linear relationship between the variables. There was independence of residuals, as assessed by a Durbin-Watson statistic of 1.767. Homoscedasticity was assessed by visual inspection of a plot of standardized residuals versus standardized predicted values. Residuals were normally distributed as assessed by visual inspection of a normal probability plot. Outliers were assessed, and 49 exist out of a sample size of 4,041. Outliers were not removed from the analysis because it is believed the result would not be materially affected.

The prediction equation is evidence-based reading and writing SAT scores = 99.96 + .84*WIDA scores. WIDA scores were a statistically significant prediction of evidence-based reading and writing SAT scores, $F(1, 4039) = 1422.58$, $p < .001$, accounting for 26% of the variation in WIDA score with adjusted $R^2 = 26\%$, a medium effect size of .51. An increase in WIDA by 1 unit leads to a .84, 95% CI [.798, .885] increase in evidence-based reading and writing SAT scores. A significant correlation was found between WIDA scores and evidence-based reading and writing SAT scores, r = .51, n = 4,041, $p = < .001$. Predictions were made to determine evidence-based reading and writing SAT scores for students with WIDA scores of 300, 350, 400, 450, and 500. For WIDA score of 300, mean evidence-based reading and writing SAT score was predicted as 352.35, 95% CI [348.48, 356.22]; for WIDA score of 350 it was predicted as 394.42, 95% CI [392.34, 396.49]; for WIDA score of 400 it was predicted as 436.48, 95% CI [434.70, 438.26]; for WIDA score of 450 it was predicted as 478.55, 95% CI [475.14, 481.96]; and for WIDA score of 500 it was predicted as 520.61, 95% CI [515.17, 526.06].

Table 7

Linear Regression Analysis of EBRW SAT Scores and WIDA Overall Subscale

B	SE	b	t	p
.84	51.1	.51	37.72	<.001***

$* = p \leq .05$, $*** = p \leq .001$

WIDA scores on evidence-based reading and writing scores on the SAT when controlling for traditional mode of instruction was analyzed. For ELL students whose mode of instruction was traditional, WIDA scores were a statistically significant predictor of evidence-based reading and writing SAT scores, $F(1, 3646) = 1248.63$, $p < .001$, accounting for 26% of the variation in WIDA score with adjusted $R^2 = 26\%$, a medium effect size of .51. An increase in WIDA by 1 unit leads to a .82, 95% CI [.778, .869] increase in evidence-based reading and writing SAT scores. A moderate correlation was found between traditional instruction, WIDA scores, and evidence-based reading and writing SAT scores, r = .51, n = 3,648, $p = < .001$.

Table 8

Linear Regression Analysis of EBRW SAT Scores and Traditional Instruction WIDA Overall Subscale

B	SE	b	t	p
.82	51.1	.51	35.34	<.001***

$* = p \leq .05$, $*** = p \leq .001$

WIDA scores on evidence-based reading and writing scores on the SAT when controlling for online mode of instruction were analyzed. For ELL students whose mode of instruction was online, WIDA scores were a statistically significant predictor of evidence-based reading and writing SAT scores, $F(1, 22) = 9.32$, $p = .006$, accounting for 27% of the variation in WIDA score with adjusted $R^2 = 27\%$, a medium effect size of .55. An increase in WIDA by 1 unit leads

to a 1.28, 95% CI [.411, 2.155] increase in evidence-based reading and writing SAT scores. A

moderate correlation was found between online instruction, WIDA scores, and evidence-based

reading and writing SAT scores, r = .55, n = 23, *p* = .006.

Table 9

Linear Regression Analysis of EBRW SAT Scores and Online Instruction WIDA Overall Subscale

B	*SE*	*b*	*t*	*p*
1.28	45.58	.55	3.05	.006

Note. * = $p \leq .05$, *** = $p \leq .001$

      WIDA scores on evidence-based reading and writing scores on the SAT when controlling

for blended mode of instruction were analyzed. For ELL students whose mode of instruction was

blended, WIDA scores were a statistically significant prediction of evidence-based reading and

writing SAT scores, $F(1, 367) = 184.20$, $p < .001$, accounting for 33% of the variation in WIDA

score with adjusted $R^2 = 33\%$, a medium effect size of .58. An increase in WIDA by 1 unit leads

to a 1.07, 95% CI [.411, 2.155] increase in evidence-based reading and writing SAT scores. A

moderate correlation was found between blended instruction, WIDA scores, and evidence-based

reading and writing SAT scores, r = .58, n = 368, *p* < .001.

Table 10

Linear Regression Analysis of EBRW SAT Scores and Blended Instruction WIDA Overall

Subscale

B	*SE*	*b*	*t*	*p*
1.07	50.89	.58	13.57	<.001***

* = $p \leq .05$, *** = $p \leq .001$

WIDA scores were a statistically significant prediction of evidence-based reading and writing SAT scores as assessed by the linear regression. When each mode of instruction (online, blended, traditional) was controlled for using the regression analysis, the overall evidence-based reading and writing SAT scores remained with a positive increase as WIDA scores increased. Online instruction revealed the largest increase in evidence-based reading and writing scores with a 1 unit increase in WIDA equal to a 1.28 unit increase on the evidence-based reading and writing SAT scores. Next was blended with a 1 unit increase on WIDA equal to a 1.07 unit increase on the evidence-based reading and writing SAT scores. Finally, traditional mode of instruction was a 1 unit increase on WIDA equal to a .84 unit increase on the evidence-based reading and writing SAT scores.

Data Analysis Limitations

Data analysis limitation in research question 5 was that outliers were kept in the study. Outliers were maintained as the simple linear regression is a robust test to account for outliers. The sample size was 4,041 ELL, 49 outliers were identified, and it was believed the result would not be materially affected.

Summary

Student-level data for high school juniors during the 2017–18 school year from the state of Michigan were accessed through Michigan Education Research Institute. School districts received a Qualtrics survey to identify if their high school juniors were one-to-one with technology. Districts that responded were charted as using either traditional mode of learning or blended mode of learning. MERI data identified virtual schools, who were used in the analysis as online mode of instruction. Descriptive statistics were analyzed to determine if mode of instruction had an impact on evidence-based reading and writing SAT scores for ELL students; if

gender had an impact on evidence-based reading and writing SAT scores for ELL students; if an interaction existed between mode of instruction and gender on the evidence-based reading and writing SAT scores for ELL students; if a difference existed between ELL and non-ELL students on evidence-based reading and writing SAT scores; and if WIDA was a predictor for evidence-based reading and writing SAT scores while mode of instruction was controlled for.

The first null hypothesis stated there was no statistically significant difference across instructional types (online, blended, traditional) on the evidence-based reading and writing portions of the SAT for ELL students. A one-way ANOVA was analyzed, and one violation of the assumptions occurred. Outliers were found, but it was believed they would not materially affect the results. The group means slightly increased but were not statistically significantly different ($p > .05$). Therefore, I accept the null hypothesis and I cannot accept the alternative hypothesis.

The second null hypothesis stated there was no statistically significant difference across gender (male, female) on the evidence-based reading and writing portions of the SAT for ELL students. An independent sample t-test was run, and one violation occurred of the assumptions test. Outliers were identified, but it was believed they would not materially affect the results as the independent samples t-test is a robust test and accounts for outliers in the trimmed mean. A statistically significant difference exists between means ($p < .05$), and therefore I can reject the null hypothesis and accept the alternative hypothesis.

The third null hypothesis stated that there was no statistically significant interaction between instructional types (online, blended, traditional) and gender (male, female) for ELL students on the evidence-based reading and writing portions of the SAT. A two-way ANOVA was run, and a violation to the assumptions test was found. Outliers exist; therefore, the trimmed

mean was used as the trimmed mean accounts for outliers. Main effect tests were carried out and were not statistically significant. No statistically significant difference was found in the interaction effect between gender and mode of instruction. Therefore, simple main effects were not carried out. I accept the null hypothesis and I cannot accept the alternative hypothesis.

The fourth null hypothesis stated there was no statistically significant difference on the evidence-based reading and writing portions of the SAT between ELL and non-ELL students. An independent sample t-test was run and a violation to the assumptions test occurred. Outliers were found, but the independent samples t-test is a robust test and accounts for outliers (Laerd Statistics, 2017). Therefore, it was believed the outliers would not materially affect the results. A statistically significant difference was identified between means ($p < .05$), and therefore I can reject the null hypothesis and accept the alternative hypothesis.

The fifth null hypothesis stated there was no predictive relationship between WIDA proficiency scores and student success on the evidence-based reading and writing portions of the SAT for the three modes of instruction (online, blended, traditional). Assumptions were checked, and a violation occurred for outliers. Forty-nine outliers occurred out of a sample size of 4,041. They were not removed from the analysis because it is believed the result would not be materially affected. WIDA scores were found to be a significant predictor of evidence-based reading and writing SAT score; therefore, I can reject the null hypothesis and accept the alternative hypothesis.

CHAPTER 5

FINDINGS, CONCLUSIONS, IMPLICATIONS, AND FUTURE RESEARCH

This research study was focused on high school ELL student and non-ELL student-level data to determine if a difference exists between mode of instruction (traditional, blended, online) and evidence-based reading and writing scores of ELL students. It compared ELLs to non-ELLs on evidence-based reading and writing SAT scores. The study identified if an interaction between gender and mode of instruction exists and if WIDA scores can predict evidence-based reading and writing SAT scores based on mode of instruction. The data were obtained through the Michigan Education Research Institute (MERI), University of Michigan research database. A Qualtrics survey was sent to all secondary administrators in the state of Michigan to identify if their juniors were one-to-one with technology for the 2017–18 school year. The school districts that replied were used in the study. The districts that were one-to-one were identified as blended mode of instruction (Maxwell, 2016). The districts that were not one-to-one were identified as traditional mode of instruction. MERI data identified districts that used online mode of instruction. The data accessed from MERI were then analyzed using SPSS to find significance.

Education has changed remarkably since March of 2020. The onset of COVID-19 sent schools across the world into remote education (Li & Lalani, 2020). This, combined with the increase in immigration of English language learners, the advancement of the digital world, and internet accessibility have changed the way education occurs (Internet World Stats, 2020). When schools were sent into remote learning, some schools were more prepared than others. With the

advancement in technology over the last 30 years, education remained relatively unchanged until the onset of COVID-19. When remote learning occurred across the United States in March of 2020, some schools were prepared to send devices home with students, some locations did not have internet accessibility even if they had devices, and other schools sent home worksheets. This indicates that there was a large disparity in quality education for all students. Schools that were able to send devices home with students and went online with learning were forced to do so with no training on theories of best practices for online learning (Li & Lalani, 2020). Teachers were delivering content to students in the same format, even though students learn in different ways. One group of students that needs differing supports is ELLs. As educators continue in a changing educational environment with a technology-based format, it is important to know how best to support the ELL population.

ELLs have significant achievement gaps compared to native English speakers. Teenage ELLs have a larger workload because they are learning English simultaneously as they are learning content for core classes, "with resulting challenges in passing tests and completing graduation requirements" (Migration Policy Institute, n.d.-a, para. 1). "ELLs are the fastest growing student population in public schools and are twice as likely to drop out of high school and have an even lower chance of completing a postsecondary education" (Parsi, 2016, para.1). The ELL population is also steadily increasing, and "all 50 state constitutions require the establishment of a system of free, public schools to serve children in primary and secondary grades" (Migration Policy Institute & Sugarman, 2019, para. 1). The law states "English Learners must have meaningful access to education" (Sugarman, 2019, para. 1). To make accommodations, educators need to be trained in how best to serve ELL students instructionally. Instruction can take place in online, blended, or in a traditional classroom format. If a traditional

classroom is where ELLs are found to have the highest success, how do educators make changes in blended and online environments to increase ELL proficiency if a traditional setting is not an option?

This chapter is organized into four sections. The first section contains a discussion of the research findings, including a summary of descriptive and inferential data on the five null hypotheses that were tested, and then followed by a conclusion of the findings. The second section discusses implications of the study. The third section reviews limitations of the research. The final section discusses recommendations for future research.

Summary of Findings

Student data accounted for 4,221 ELL students in the state of Michigan whose scores were analyzed. ELL students that were identified as using a traditional mode of learning accounted for 3,810 (90%) data points, 37 (.01%) were ELL students identified as using an online mode of learning, and 374 (.09%) were ELL students identified as using blended learning. ELL and non-ELL students consisted of 104,223 student data tested, 100,002 (97%) were non-ELL, and 4,221 (3%) were ELL students. The ELL gender ratio was 1,937 (46%) female, and 2,284 (54%) male.

Research Question 1

The test results revealed evidence-based reading and writing scores on the SAT increased from online (M = 407.84, SD = 58.89), to traditional (M = 420.55, SD = 60.00), to blended (M = 422.70, SD = 62.68) in that order, but the differences between these modes of instruction (online, blended, traditional) were not statistically significant, F(2,4218) = 1.059, p = .347. The group means slightly increased, but were not statistically significantly different (p > .05). Therefore, no significant difference was found, and the null was retained.

Research Question 2

Results indicated the evidence-based reading and writing scores were higher for female ELL students (M = 424.24, SD = 59.53), than for male students' ELL scores (M = 417.66, SD = 60.62), a statistically significant difference, M = 6.48, 95% CI [-10.11, -2.83], t(4219) = 3.49, *p* < .001. A statistically significant difference was identified in evidence-based reading and writing SAT scores between male and female ELL students, with females scoring higher than males, M = 6.48, 95% CI [-10.11, -2.83], t(4219) = 3.49, *p* < .001, d = .11. A statistically significant difference was identified between means (*p* < .05), and, therefore, the null hypothesis was rejected, and the alternative hypothesis was retained.

Research Question 3

An analysis of the main effect for mode of instruction was performed, which indicated the main effect was not statistically significant, F(2,4215) = 1.23, *p* = .293. No statistically significant main effect exists between gender on evidence-based reading and writing SAT scores, F(1,4215) = 3.48, *p* = .062. The interaction effect was tested between gender and mode of instruction (online, blended, traditional) and was found to not be statistically significant, F(2,4215) = 2.39, *p* = .092. Therefore, the null hypothesis was rejected, and the alternative hypothesis was retained.

Research Question 4

Results indicated the evidence-based reading and writing SAT scores were higher for non-ELL students (M = 509.62, SD = 98.33) than ELL students (M = 420.63, SD = 60.21), a statistically significant difference, M = 88.99, 95% CI [-90,91, -87.07], t(5221.06) = -91.042, *p* = 000, d = -.92. A statistically significant difference exists between means (*p* < .05), and, therefore, the null hypothesis was rejected, and the alternative hypothesis was accepted.

Research Question 5

WIDA scores were a statistically significant predictor of evidence-based reading and writing SAT scores as assessed by the linear regression; therefore, the null hypothesis was rejected, and the alternative hypothesis was accepted. When each mode of instruction (online, blended, traditional) was controlled for using the regression analysis, the overall evidence-based reading and writing SAT scores remained with a positive increase as WIDA scores increased. Online instruction revealed the largest increase in evidence-based reading and writing scores where a 1 unit increase in WIDA was equal to a 1.28 unit increase on the evidence-based reading and writing SAT scores. Next was blended, where a 1 unit increase on WIDA was equal to a 1.07 unit increase on the evidence-based reading and writing SAT scores. Finally, traditional mode of instruction, where a 1 unit increase on WIDA was equal to a .84 unit increase on the evidence-based reading and writing SAT scores.

Conclusions

Research Question 1: No significant difference across instructional types was revealed in the test results. Looking at traditional, online, and blended modes of instruction it was determined that no mode of instruction significantly produced a higher evidence-based reading and writing scores than another. When looking at the data, online instruction has the lowest SAT scores, and then traditional is slightly higher than online, and, finally, blended mode of instruction reveals the highest evidence-based reading and writing SAT scores. However, the scores are not divergent enough to be considered a significant difference.

This is an important finding as the country is coming out of a pandemic that forced all school districts into virtual learning for over a year. Federal funding has been provided to increase internet accessibility, and funding has been provided educationally to support online

learning. In conclusion, online learning is not going away, so it is important to identify the best methods of instruction and supports for ELLs. The findings in this study did not identify a best mode of instruction for ELLs. The pandemic has created a new normal and has allowed for an increase in online and blended instruction. With the availability of online and blended instruction for students it is important the instruction is done with best practices. Research has been done on student engagement and the importance of student engagement. In a study by Schindler et al. (2014), different modes of technology were reviewed and measured for student engagement. The findings provide support for including technology as a factor that supports student engagement. One key finding was most of the technologies reviewed had a positive effect on student engagement, which could lead to a larger impact on learning outcomes.

Research Question 2: A significant difference was identified between males and females on the evidence-based reading and writing portions of the SAT for ELL students. The results indicated that female students test higher than male students on the evidence-based reading and writing portions of the SAT. This suggests that more female ELLs would be more prepared for college than males. The SAT is the college and career readiness standard for the state of Michigan and prior to the pandemic was used by most colleges and universities as a main qualifier for entrance. In conclusion, with respect to our desire to increase college and career readiness for ELLs, the findings have done nothing to change the trends in the last 20 years of females testing higher than males.

Research Question 3: No significant interaction exists between mode of instruction and gender. When data were analyzed to see if gender (male, female) and mode of instruction (online, blended, traditional) together had an impact on the evidence-based reading and writing portions of the SAT, statistical tests showed no connection. Evidence did not support a

connection between gender and instructional type; therefore, no tests were run to analyze the individual look at online, traditional, and blended modes of instruction.

In research question two it was found that female ELLs score higher on the evidence-based reading and writing portions of the SAT. If mode of instruction (online, blended, traditional) was impacting the score, this information would have been beneficial in identifying strategies to support both male and female ELLs to be college and career ready. In conclusion, the purpose of this study is to increase college and career readiness for all students, it was identified that all modes of instruction are valuable platforms for education for both male and female ELLs.

Research Question 4: Results indicated non-ELL students score significantly higher than ELL students on the evidence-based reading and writing portions of the SAT. Since ELLs have significant achievement gaps compared to native English speakers, ELLs have a larger workload because they are learning English and content for core classes simultaneously, "with resulting challenges in passing tests and completing graduation requirements" (Migration Policy Institute, n.d.-a, para. 1). This research question supports knowledge gained from prior studies. The ELL population is steadily increasing, and the law states "English Learners must have meaningful access to education" (Sugarman, 2019, para. 1). In conclusion, a steady increase in immigration over the last ten years has increased the number of ELLs in classrooms. The findings have done nothing to change the trends of non-ELLs testing higher than ELLs.

Research Question 5: WIDA scores were a statistically significant prediction of evidence-based reading and writing SAT scores as assessed by the linear regression. WIDA is the test used to measure English language skills for ELLs. The statistical analysis indicates that how an ELL

student performs on the WIDA would determine how well the ELL student would perform on the evidence-based reading and writing portions of the SAT.

Reviewing which mode of instruction had the largest impact on SAT scores, online instruction revealed the largest increase in evidence-based reading and writing scores where a 1 unit increase in WIDA was equal to a 1.28 unit increase on the evidence-based reading and writing SAT scores. This means if the WIDA score increases by 1, the evidence-based reading and writing score would increase by a value of 1.28. Next was blended, where a 1 unit increase on WIDA was equal to a 1.07 unit increase on the evidence-based reading and writing SAT scores. Finally, traditional mode of instruction, where a 1 unit increase on WIDA was equal to a .84 unit increase on the evidence-based reading and writing SAT scores. This suggests that the online mode of instruction shows the largest increase in evidence-based reading and writing scores as predicted by the WIDA score, followed by blended, and then traditional mode of instruction. More research needs to be done on best mode of instruction. The sample size of online learning could have had an impact on the outcome. The results could also be addressing the importance of student engagement and student-centered instructional methods. It is important to have further research on mode of instruction for ELLs.

The prediction equation can be used to identify what WIDA score would need to be obtained to meet the college and career readiness benchmark for the evidence-based reading and writing portions of the SAT. For example, the calculation showed a 450 on the WIDA predicts a 478.55 on the evidence-based reading and writing portions of the SAT. The state of Michigan's benchmark is a 480 on the evidence-based reading and writing portions of the SAT. This suggests that if ELL students can score a 450 on WIDA they would have the ability to comprehend content in English and be able to show their competency on the evidence-based

reading and writing portions of the SAT to be considered college and career ready. In conclusion, college and career readiness for all students has been a goal for school districts for many years. As the ELL population has increased in districts over the years, there is a gap in college readiness as seen on the evidence-based reading and writing SAT scores. WIDA is the growth measure for ELLs that is given annually. If we increase WIDA growth, we increase college readiness.

In conclusion to this research, the pandemic has created a new normal and has allowed for an increase in online and blended instruction. With respect to our desire to increase college and career readiness for ELLs, the findings have done nothing to change the trends in the last 20 years of females testing higher than males. It was identified that all modes of instruction are valuable platforms for education for both male and female ELLs. A steady increase in immigration over the last ten years has increased the number of ELLs in classrooms. The findings have done nothing to change the trends of non-ELLs testing higher than ELLs. Lastly, WIDA is the growth measure for ELLs that is given annually. Increased WIDA scores increase college readiness.

Implications Based on Findings

The overarching question of this study was does WIDA score and mode of instruction (online, blended, traditional) impact evidence-based reading and writing SAT scores for ELLs? The study indicates that WIDA is a predictor of the evidence-based reading and writing SAT scores. The college and career indicator score for the state of Michigan is a 480 on the evidence-based reading and writing portions of the SAT. Predictions were made using the prediction equation to determine evidence-based reading and writing SAT scores for students with WIDA scores of 300, 350, 400, 450, and 500. It was found that a WIDA score of 450 predicts 478.55,

95% CI [475.14, 481.96]. This suggests that ELLs need to have a WIDA score of 450 or higher

to attain a college and career ready score on the evidence-based reading and writing portions of

the SAT. Knowing that ELLs need a 450 on the WIDA to test at a 480 on the evidence-based

reading and writing portions of the SAT is valuable information for ELL students, classroom

teacher, ELL teachers, ELL directors, building principals and curriculum coordinators.

In terms of implications for mode of instruction, the study revealed an increase in WIDA

by 1 unit leads to a .82, 95% CI [.778, .869] increase in evidence-based reading and writing SAT

scores when controlling for traditional instruction. When controlling for online instruction, an

increase in WIDA by 1 unit leads to a 1.28, 95% CI [.411, 2.155] increase in evidence-based

reading and writing SAT scores. When controlling for blended instruction, an increase in WIDA

by 1 unit leads to a 1.07, 95% CI [.411, 2.155] increase in evidence-based reading and writing

SAT scores. In this study, online mode of instruction indicates the largest unit gain of WIDA

score to evidence-based reading and writing scores, next is blended, and traditional mode has the

smallest gain at 1 unit of increase on WIDA to .82 gain on evidence-based reading and writing

SAT score. This suggests that online learning and blended learning would be the preferred mode

of instructions for ELLs to have a greater impact on evidence-based reading and writing SAT

scores. This could be reflective of student engagement when technology is used, and the

student-centered approach is utilized in instructional practices. Even though the mode of

instruction was not a large enough value to be found as significant, the evidence suggests that

technology used in learning may result in increased evidence-based reading and writing SAT

scores.

The implication from this study is the importance of the WIDA score for ELLs to attain

college and career readiness. ELLs need to grow annually to be on track on the WIDA to attain

450 or higher score before they take the SAT their junior year. This reality impacts every level of the education system from students, classroom teachers, ELL teachers, director of ELL, building administrators, and curriculum directors. Data indicate that ELLs have significant achievement gaps compared to native English speakers (Parsi, 2016). Evidence supports that ELLs are the fastest growing student population in public schools. Since the ELL population is only continuing to grow, and ELLs have significant achievement gaps compared to non-ELL students, educators must learn from the implications of this study to close the achievement gaps of ELLs.

The implication for students is the importance of being aware of the necessary WIDA score to be able to attain college and career readiness. It is important that the WIDA measures are shared with ELLs annually to make sure they understand where they are growing and where they still need to grow to reach the college and career readiness standard by their junior year of high school. If students are aware of their WIDA scores in elementary through high school, appropriate goals can be set to attain college and career readiness standard.

The implication for the classroom teacher is the importance of understanding the value of growth on the WIDA annually since the goal is for every ELL student to attain a 450 or higher before their junior year of high school. Classroom teachers need to understand the strategies to teach ELLs to help develop the language skills in the classroom, and how technology plays a role in the learning process. SIOP is a researched based strategy used in the ELL classroom. It is also important that the classroom teacher understand that females are testing higher than males on the evidence-based reading and writing portions of the SAT. What are strategies that can be used in the classroom to engage both males and females?

The implication for the ELL teacher is first knowing that the WIDA is a predictor of the evidence-based reading and writing portions of the SAT. ELL teachers need to be aware that a

450 or higher on the WIDA would lead to college and career readiness. As ELL teachers work with their case load of ELLs, goals should be set quarterly and annually to allow for ELLs to attain college and career readiness by their junior year. Communication between the classroom teacher and ELL teacher is imperative for each student. Classroom teachers need to receive professional development on how to best support ELLs and what that might look like with technology. ELL teachers need to be aware that female students are testing at higher rates on college and career readiness than males.

The implication for ELL directors and curriculum directors is first knowing that the WIDA is a predictor of the evidence-based reading and writing portions of the SAT. As curriculum directors plan for professional development, the importance of ELL strategies in the classroom should be planned. ELL directors, as they work with the teachers and their caseloads, must realize the importance of reviewing WIDA data and seeing the goals that have been set for each ELL student. As ELL directors observe ELL teachers, it is important to observe how data are discussed in Professional Learning Communities (PLCs), and how this impacts teaching methods in the classroom. How is technology being used in the classroom to engage both males and females into the content, and increasing language learning?

The key takeaway from this study is that WIDA is a predictor of the evidence-based reading and writing SAT score. The critical value for WIDA is a 450 to attain a college and career ready score on the evidence-based reading and writing portions of the SAT. Also, females test better than males on the evidence-based reading and writing portions of the SAT, and technology impacts instruction for ELLs positively. The implication of this information is impactful through every point in the educational hierarchy from the ELL student to the teacher, ELL teacher, building principal, ELL director and curriculum director.

Limitations of Study

In this study limitations include generalizability of the sample, sample data collected on public schools in Michigan and sample size, and, finally, outliers found in assumptions tests during SPSS analysis. Generalizability is the extension of results from a study to the larger population. In this study, generalizability of the data is limited because not all schools in Michigan have a significant ELL population and, therefore, the results may not apply to them specifically. Still, the findings should have relevance for all schools who are interested in the relationship between instructional method and evidence-based reading and writing SAT scores.

In addition, the state of Michigan does not require schools to identify as a one-to-one with technology, which impacts the blended learning data. One-to-one with technology is when every student has a personal technology device to use that is provided by the school district (Chang, 2016). To minimize this limitation, school district data were only used from districts that are confirmed as a one-to-one high school. A Qualtrics survey was used to identify blended mode of instruction. The limitation was that not all districts responded to the survey; this caused an unequal sample size for the three modes of instruction. Student data accounted for 4,221 ELL students. ELL students that were identified as traditional mode of learning accounted for 3,810 (90%) data points, 37 (.01%) were ELL students identified as online mode of learning, and 374 (.09%) were ELL students identified as blended learning. ELL and non-ELL students consisted of 104,223 student data tested, 100,002 (97%) were non-ELL, and 4,221 (3%) were ELL students. The ELL gender was 1,937 (46%) female, and 2,284 (54%) males.

Last, while running the assumptions tests during SPSS, outliers were found in the data. Outliers in data analysis are a limitation. The outliers were retained in the data because it is believed the outliers would not materially affect the results.

Recommendations for Future Study

Based on results indicating WIDA predicts evidence-based reading and writing SAT scores while controlling for mode of instruction, and that females test significantly higher than males on the evidence-based reading and writing portions of the SAT, the following future research recommendations are made:

1. This study only measured 11th grade students. Further research needs to be conducted on ELL students in grades K–12.

2. Further research needs to be conducted on mode of instruction (online, blended, traditional) at each grade level K–12 for both ELL and non-ELL students.

3. Further research needs to be conducted on the different learning styles of males and females, both ELL and non-ELL students.

4. Further research needs to be conducted on the collaboration of ELL teachers and classroom teachers.

5. There are minimal requirements for educators to teach ELL students. Further research needs to be conducted on qualifications. Coursework should include research-based ELL teaching strategies.

6. The recent COVID pandemic moved districts to 100% online learning. Teachers were teaching online with little to no training on best practices for online teaching. Further study needs to be conducted on both strategies for online teaching, and baseline skills students need to be successful for online learning at K–5, 6–8, and 9–12 grade levels

7. A qualitative study should be explored to study both ELL student perception and teacher perception of the best mode of instruction for learning.

Summary

It is a significant task to overcome the disparities in education for ELL students, as it is a highly complex issue. Further, the ELL population is only continuing to grow, and all students have the right to an education that would prepare them to be college and career ready. There is not one solution to this situation. However, learning which mode of instruction (online, blended, traditional) for ELL students is most impactful for increased evidence-based reading and writing scores, and that WIDA predicts evidence-based reading and writing scores is a start. District ELL directors and teachers need to be aware of WIDA scores for all students on their caseload. Teachers need to make sure they are growing annually on WIDA to be prepared to have the language skills necessary to be successful on the college and career readiness test. Building leaders need to be aware of ELL student language levels, and ensure students are placed in classes with appropriate modes of instruction. District leaders need to provide high quality professional development in English learning, in teaching strategies for all modes of instruction for ELL students, and in teaching strategies based on gender. Finally, Michigan educational policies need to address ELL qualifications required for all teachers. As the ELL population increases across the nation, it is our job as educators to prepare all students for college and career readiness.

This research result used data structured and maintained by the MERI-Michigan Education Data Center (MEDC). MEDC data are modified for analysis purposes using rules governed by MEDC and are not identical to those data collected and maintained by the Michigan Department of Education (MDE) and/or Michigan's Center for Educational Performance and Information (CEPI). Results, information, and opinions solely represent the analysis, information

and opinions of the author(s) and are not endorsed by, or reflect the views or positions of,

grantors, MDE and CEPI or any employee thereof.

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APPENDIX A: SURVEY EMAIL

Dear High School administrator,

I am Candy Van Buskirk, a PhD candidate at Indiana State University. I am currently working on research regarding online, blended, and traditional learning and the effects of WIDA proficiency. In order to continue the research, I need to identify Michigan schools that were one-to-one with technology for the junior (11th grade) class during the 2017–18 school year. If you would simply mark yes or no on the attached Qualtrics survey identifying if your districts juniors (11th) grade students were one-to-one with technology during the 2017–18 school year, and label the name of your district.

https://indstate.qualtrics.com/jfe/form/SV_7NVzGTyy8RyLH5b

If you have any questions, please contact *Candy Van Buskirk, 19704 Dogwood Dr., New Buffalo, MI 49117, 585-944-7975, cvanbuskirk@sycamores.indstate.edu.*

If you have any questions about your rights as a research subject or if you feel you have been placed at risk, you may contact the Indiana State University Institutional Review Board (IRB) by mail at Indiana State University, Office of Sponsored Programs, Terre Haute, IN 47809, by phone at (812) 237-3088 or by email at irb@indstate.edu.

Best Regards,

Candy Van Buskirk

PhD Candidate

Indiana State University

APPENDIX B: QUALTRICS SURVEY

Was your school district one-to-one with technology in grade 11 (juniors) during the 2017-18, school year?

- Yes

- No

What school district are you reporting for?