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Assessing Language Learners In Mathematics: A Single-Subject AB Quasi-Experimental Study Exploring The Impact of Dual Language and Monolingual Classrooms on Achievement

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ASSESSING LANGUAGE LEARNERS IN MATHEMATICS: A SINGLE-SUBJECT AB QUASI-EXPERIMENTAL STUDY EXPLORING THE IMPACT OF DUAL LANGUAGE AND MONOLINGUAL CLASSROOMS ON ACHIEVEMENT

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ABSTRACT

Dual language classrooms provide instruction for language learners to use their first language (L1) as well as their second language (L2) to learn academic content. The goal of the study was to impact the decision-making among educational leaders who may be challenged by the dual language classroom due to the logistics and financial demands such a program possesses for school district leaders. A single-subject AB quasi-experimental study explored the impact of one monolingual mathematic classroom and making it into a dual language classroom providing a Spanish interpreter during whole group math instruction time. The model that was delivered replicates what has been studied, but in the context of the researcher's community where dual language classrooms have never been tested. The researcher studied the way three *developing* English language learners were affected by the dual language element and how these students performed on assessments compared to the monolingual classroom English learners. The research was guided using James Cummin's Common Underlying Proficiency (CUP) Theory. This study also aimed at exploring and reporting the English language learners' (ELL) experiences and bringing into the discussion the children's lens probably for the first time as well as the teachers. The study showed no significant difference in aMath FastBridge scores between the dual language classroom and monolingual classroom. The researcher recommends conducting this study for at least an entire semester, having the researcher observing the monolingual classrooms at random for the purpose of providing feedback regarding implementation, utilizing the services of the interpreter during small group instruction, and writing a grant to cover the costs associated to the dual language materials.

Keywords: dual language, English learners, English language learners, English as a second language, teaching English as a second language, developing English learners

CHAPTER 1. INTRODUCTION

In today's American classrooms, more students are coming in speaking a language other than English. In the fall of 2021, 49.5 million students in grades pre-kindergarten through twelfth were enrolled in public school districts across the United States (National Center for Education Statistics, 2022). Of these students, 5.1 million were English language learners (National Center for Education Statistics, 2022). In Minnesota, 893,203 were enrolled in public schools and 76,361 were identified as English learners (Minnesota Department of Education, 2021). Among these English learners, 339 different home languages were identified with Spanish being the most spoken language in their homes (Minnesota Department of Education, 2021).

As educators in public school districts continue to foster academic development in English to all students, the language barrier continues to be a problem that affects academic achievement for students who are identified as English Language Learners (ELL). For English learners to succeed, there is a greater need to explore resources and strategies other than teaching English as a second language. The author is an elementary teacher of English as a second language in a K-12 monolingual school district where 60% of the students in kindergarten through fifth grade identify as English language learners (Minnesota Report Card, 2023). The author connects with the concern that students who speak another language other than English may need an out-of-the-box approach to learning in the general education classroom in the monolingual K-12 district. Changing the third-grade monolingual classroom into a dual language classroom instruction would fit the needs of English language learners who need to hear academic instruction in their first language in order to transfer the content to the second language. Applying a dual language classroom allows students to hear the content and literacy instruction in both English and Spanish (Center for Applied Linguistics, n.d.). Goodrich and

Lonigan (2017) stated, “according to the common underlying proficiency model, as children acquire academic knowledge and skills in their first language, they also acquire language-independent information about those skills that can be applied when learning a second language” (para. 1).

Translating academic mathematic vocabulary words in the third-grade classroom is the focus of this study. Martiniello (2009) states, “Assuring valid and fair assessments of subject-based skills for students who are not proficient in English is one of the most pressing and challenging issues confronting large-scale educational assessment today” (p. 160). The author also reported that ELLs are the lowest scoring groups in mathematics assessments. In an effort to see an increase in assessment scores of English language learners in a third-grade monolingual classroom, the researcher wanted to recruit a bilingual educator who works in the district to help translate and work in the classroom during the study. Not all of the students in the classroom are Spanish speakers, there is also Karen, Amharic, and English.

This chapter will focus on a brief literature review which will discuss the historical overview of language instruction for non-English speakers, non-English speaking immigrant children, evidence-based instructional practices for ELLs in the twenty-first century, the languages spoken in the United States and how limited English proficiency relates to students who migrate and are also born in the US. Chapter One will also state the problem that serves as context for this study, the theoretical framework chosen to frame this study, the purpose of this study, research questions and definition of variables, the significance of the study, limitations and delimitations, and finally the ethical considerations for the participants in this study.

Brief Literature Review

Historical Overview of Language Instruction for Non-English Speakers

English taught as a second language dates back to 1642, when the General Court of Massachusetts Act required masters and parents to focus on the education of children and apprentices (Cavanaugh, 1996). During this period, most of society were English speaking, or rather, knew how to read the English Bible. In 1753, Benjamin Franklin sought out the emphasis to teach English in classrooms because he was concerned about how diverse Pennsylvania was becoming with German-language (Pearson, 2018). A vast growth of immigration followed from the 1800s to 1900s. As stated by Cavanaugh (1997), "For some, the question of bilingual education was purely political" (p. 41). The role of English language instruction was important to making the nation separate from other nations, and one way to achieve this was differentiating the American language from English (Pearson, 2018). However, schools were ill-equipped with the means necessary to teach students who spoke a different language than English, therefore every student was assessed by the same standard held in education (Cavanagh, 1997). During this time, Germans was the largest non-English speaking group (Fouka, 2019). After World War I, educators followed the philosophy that everyone needed to learn English to understand the United States (U.S.) Constitution, demonstrating loyalty to this nation (Cavanaugh, 1997). The 1917 Trading with The Enemy act, as well as the Espionage Act, required all foreign language publications relating to the war must be put into English (Fouka, 2019).

It was not until 1982 that Minnesota required a licensure to teach English as a second language (TESL) (Tarone, 2016). Higher education had TESL programs already implemented to show support for other country's students (Tarone, 2016). Then, in 1996, the Teachers of English to Speakers of Other Languages (TESOL) was established "out of professional concern over the

lack of a single, all-inclusive professional organization that might bring together teachers and administrators at all educational levels with an interest in teaching English to speakers of other languages (ESOL)" (Alatis, n.d., par. 1). Finally, in 2003, the development of the World-Class Instructional Design and Assessment (WIDA) took place (WIDA, 2022). WIDA's mission is "to be the most trusted and valued resource in supporting the education of multilingual learners" (WIDA, 2022, par. 6). To this day, Minnesota school districts implement the WIDA standards into their teaching. Dr. Timothy Boals is the Founder and Director of WIDA with knowledge in language education, educational policy, and Spanish language and literature (WIDA, 2022). The staff who conduct research and develops new criteria are from all around the world, many of which used to be teachers (WIDA, 2022).

Non-English-Speaking Immigrant Children

English language learners (ELLs) are students who come from diverse families with different needs relating to academics, social-emotional support, and language skills (Colorín Colorado, 2023). English learners live all over the United States making this country their home. "While some ELLs are immigrants and newcomers to this country, the majority of ELLs enrolled in U.S. schools are born in the U.S. and as such, they are American citizens" (Colorín Colorado, para. 7). About 17% of students in grades K-5 are noncitizens (Bialik et al., 2018).

Immigrant children face increased levels of anxiety, stress, and depression (Todd and Martin, 2020). Compared to White European immigrants, the Latinx immigrants, Asian Americans, and Pacific Islanders are reported to have higher rates of depression, anxiety, and post-traumatic stress disorder (Todd & Martin, 2020). Factors that may cause these feelings are socio-economic status (SES), separation of families, and political stressors (Pratt-Johnson, 2015), all which relate to the performance in academics.

A larger number of adult-immigrants arrive in the U.S. with little or no education, increasing the likelihood of working a low-wage job (Camarota & Zeigler, 2016). Families may also live in poverty and lack health insurance, receive support from welfare, and are also likely to have lower possibilities of owning their own home (Camarota & Zeigler, 2016). As stated by Hauser (1994) in Shin and So (2018), "socioeconomic status describes a person's material circumstances, level of formal schooling, and occupational status" (para. 2). Research conducted by Shin and So (2018) focused on the role SES plays in second language learning, they found that students who were members of a high SES household had a greater variety of opportunities to learn a different language as compared to ELLs who were members of a low-SES household. This difference of economic factors plays a part on academic learning because the more chances to use language in and outside of the classroom, the greater opportunities to develop said language. If language is not achieved, academic learning becomes more negatively impacted as each year progresses.

Another major barrier in student learning is the lack of background knowledge regarding how and when the English learning student came to the United States and who they are living with. In a study by Wall and Musetti (2018), the researchers focused on how to best support English learner students and their families. One of the biggest obstacles English learners from the Latinx community studied faced were the social-emotional challenges stemming from "deep emotional hunger" (Wall & Musetti, 2018, p. 4). One of the parents participating in the study stated that often times the parent will find a job first before asking their entire family to move. Once the child(ren) are able to come to the U.S., the child is learning the culture for the first time as well as reconnecting with family they had not seen over a long period of time (Wall and Musetti, 2018). Wall and Musetti stated that "separation from their primary caregivers is one

source of trauma for many Latinx students in the focal school being studied" (p. 5). Students who are U.S. citizens also understand they have relatives in another country. Due to this distance between relatives, students are unable to spend time with these relatives and the culture from which they come from. Time to visit family in another country depends on flight costs, availability at work, and availability for the entire family to go. As school in the Midwest runs from the end of August through May, often times students have no choice but to leave for extended periods of time during the academic school year.

These factors just scratch the surface of what the English learner native to the United States and immigrant have to encounter daily. These stressors play a vital part in non-native English learners' ability to learn a second language.

Twenty-First Century Evidence-Based Instructional Practices for ELL Students

Second language acquisition is the term used to describe a student who has already established a first language and is beginning to learn a second language (Fromkin et al., 2017). "Maintaining or developing a home culture while learning and adjusting to American culture is neither simple nor straightforward" (Wright, 2019, p. 21). The success of learning a second language depends on a variety of factors such as age, talent, motivation, and place where the language is being learned (Fromkin et al., 2017). According to Fromkin et al. (2017), second language learners go through similar stages of learning as they do for their first language. This includes word order and making meaning of sentences. Wright (2019) also believes that children are able to learn a second language because of the simplified manner in which adults talk to them. Wright (2019) calls this *motherese*, or child-directed speech (CDS). This description of talk includes speaking slowly and more clearly as well as more proper sentences with high pitch tones (Wright, 2019). Fromkin et al. (2017) also believe that second language learners (L2ers)

rely on their first language grammar in the beginning stages of understanding English to apply to some of the rules in the English language. Theories of bilingual development believe bilingual children develop two languages in the same way that monolingual children do with one language (Wright, 2019).

Part of the academic development among bilingual students in a dual language program is the working memory function of the brain. “The mechanism in which bilingualism leads to this experience-induced cognitive change is likely based on the need to monitor attention to the target language in the context of joint activation of the other language” (Morales et al., 2012, par. 1). Working memory is one of the brain’s important functions that allows individuals to process and use the information as well as allow individuals to remember the things they are learning (Jacobson, 2022). “Bilingual children are viewed as experiencing some advantages in executive processing when compared with monolingual children” (Swanson et al., 2018, p. 380). Scientists have studied more positive effects of cognitive function when students are learning more than one language (Mohr et al., 2018). “Neuroscientific studies are now showing that earlier exposure also changes the physiology of the brain. In other words, while the brain processes one or more languages, it is being changed by the nature of the languages it is processing” (Mohr et al., 2018, p. 12). English language learners who are processing information presented in a second language use different regions of the brain to manage second language sounds (Archila-Suerte et al., 2018). During this distinguish of sounds phase, the brain increases grey matter, this is mostly the neurons’ bodies, which is the thickness, volume, and surface area, as well as white matter, which is the connectivity area (mostly the neuron’s axons), to make more sense of the world around them as compared to monolingual speakers (Pliastikas et al., 2020). Pliastikas et al. (2020) stated this increase of processing as compared to monolingual peers occurs in late

childhood and adolescence with increased bilingual experience. Swanson et al. (2018) continue to reflect that limited studies have been conducted on students who have learned their first language initially, and then learned their second language. “Learning vocabulary of English can become particularly complicated for language-minority students when words are not translatable between English and their home language” (Jarrett, 1999, p. 16). One example of this is using the word fluffy. The only translation to Spanish would be the equivalents for *furry* and *spongy*, which are not ideal translations for the word being used. Students may also understand the meanings of new vocabulary terms better if the words are in their home language (Jarrett, 1999).

Making decisions on the best instruction for English language learners “it is important to understand the different backgrounds and starting points that young people bring with them to school, the strengths and limitations of individuals and groups of learners, and the motivations and aspirations that shape the learning process” (OECD, 2012, p. 136). Effective instructional practices in classrooms have been studied and shown to improve ELs understanding of content information. Such practices include more time on tasks, repeated directions, ability to ask questions, interaction with peers and teacher, and opportunities to investigate mathematical solutions to problems (Valle et al., 2012). According to What Works Clearinghouse (2014), teachers should decipher between five to eight vocabulary words for the English learner to focus on. This will allow students more time on the task practicing the vocabulary words and utilizing them in listening, writing, and speaking activities. Repetition of directions and classroom content should be relevant to enhance learners’ understanding of mathematical problems (Duff, 2014). Teachers should also demonstrate how to properly ask questions as well as interact with peers and teachers; “for example, students could be asked to briefly explain their reasons for how they solved a math problem or use a few content-specific vocabulary words to explain a process they

are learning about in science" (What Works Clearinghouse, 2014, p. 40). Valle et al. (2012) also state that other effective ways of teaching English language learners are incorporating students' culture as well as building on what the student already knows. Teachers who create an encouraging cultural classroom promote cultural awareness and foster acceptance of others (Drexel University, 2000). "Teaching diversity exposes students to various cultural and social groups, preparing students to become better citizens in their communities" (Drexel University, 2000, para. 20). Teachers can begin to foster the understanding and acceptance of culture in the classroom by getting to know each individual student and the students' academic abilities by limiting ethnic stereotypes or prior experiences with students of similar backgrounds (Learning for Justice, 2023).

In a study conducted by Valle et al. (2012), effective instructional practices were researched to reduce the opportunity gap and identified ways White non-Hispanic non-ELL, Hispanic-ELL, and Hispanic non-ELL students excelled in mathematic performance in grades 3 - 5. The researchers observed how often teachers centered instruction around teacher-directed whole class discussion, teacher-directed small group, teacher-directed individual activities, and child-selected activities (Valle et al., 2012). The researchers found that teaching whole-group discussion as well as textbooks or worksheets were implemented almost every single day and most often for English learners. Child-selected activities and manipulatives were used the least at only once or twice a week. The research completed by Valle et al. (2012) "revealed that workbooks and textbooks had a significant contribution to the students' mathematics achievement" (p.178). However, the researchers found this type of centered instruction limited ELLs opportunities to grow effectively. What Works Clearinghouse (2014) specifies that during mathematic instruction time, clearly teaching academic vocabulary words are needed for

understanding the content material being taught. Teachers can choose which words should be taught first and thoroughly for students to understand (What Works Clearinghouse, 2014).

Closing the opportunity gap is one of the main reasons schools are taking a closer look into how to develop the best instruction for English language learners. Freeman and Freeman (1993) state that, "the most effective way for bilingual students to develop both academic concepts and English language proficiency is through their first language" (p. 553). Two types of these programs that incorporate students' first language is also known as Two-Way Immersion (TWI) and dual language classrooms. "The programs provide both groups of students with core academic instruction in both languages" (The Education Alliance, n.d.). However, in a standard TWI, proficiency in the student's native language is at the center of instruction for about 90% of the time, while English is only 10% of the time. In a dual language program, academics maintain the same academic standard for both English learners and native English speakers (The Education Alliance, n.d.). In a study conducted by De Jesús (2008), a public school implemented a dual language education program to students beginning in kindergarten. By the time the students reached fourth grade, 80% of English dominant (ED) and ELLs achieved proficiency on statewide tests, "vastly surpassing English-dominant mainstream students and bilingual students in the school" (p. 203). Of these students, it was also noted that each year it was harder to determine who was ELL and English dominant because students were substantially progressing in the English language (De Jesús, 2008).

While it has been demonstrated that when promoting ELLs' language into classroom content at an early age the student's growth is significantly higher, it is also important to implement the necessary instructional practices that apply to all students within a grade level. As the United States continues to grow the number of students who speak another language other

than English, it is important to keep in mind that all children deserve an equal opportunity to education, that starts by fostering the students' native language within the classroom as well as outside of the classroom.

Statement of the Problem

Students who are identified as English language learners progress through the K-12 public school system lacking the language tools needed to progress each year and become proficient in English. If English language learners never fully reach academic language proficiency, this problem continues to grow as they go through high-level stress and high-stakes tests provided only in English to determine their knowledge of academic content which are used to determine their level of success in school. "According to the affective filter hypothesis, high anxiety and low self-confidence can cause an English learner to filter out language inputs and make it extremely difficult to acquire another language" (Hanna, 2017, para. 7). The affective filter is one of Steven Krashen's theories in learning a second language. This filter includes motivation, attitude, anxiety, and self-confidence (Du, 2009). These four factors in the affective filter are accountable for the difference in an individual's thinking process (Du, 2009). "Comprehensible input may not be utilized by L2 acquirers if there is a 'mental block' that prevents them from fully profiting from it" (p. 162). A highly diverse population in a monolingual school district in Southwest Minnesota, with Spanish being the dominant culture at 63.4% (Minnesota Report Card, 2023), and the English learner population of 58.0% (Minnesota Report card, 2023), the achievement of academic proficiency and understanding amongst English language learners results in a large spectrum of variability. As stated by Swanson et al. (2018), "few studies have focused on sequential bilinguals (who learn their L1 first and then L2 later) with different levels of language proficiency on executive processing and math" (p. 380).

Executive processing helps students to process the information given before to in the classroom and work through the problem on their own before asking for help (Platas, 2023). Although there is evidence proving dual language classrooms benefit English learners, research is imperative to be conducted within the monolingual school district because of the urgency for bilingual classrooms. With the vast majority of the district being English language learners, and never exposed to a dual language classroom, there is an interest to replicate prior studies to develop the best dual language classroom to support student L2 knowledge and skills. This would have an impact on how the monolingual classrooms could be changed in the future of teaching English learners in the district. It can be anticipated that the dual language classroom will be beneficial, however, will implementing a dual language program in one third grade classroom be enough to decide that this dual language will work for English learners at all grade levels when a bilingual teacher is available?

In order to think about reducing the opportunity gap, the researcher wanted to take a closer look at changing one monolingual mathematic classroom and making it into a bilingual classroom. The researcher wanted to study the way *developing* English language learners were affected by the dual language element and how these students performed on assessments compared to the monolingual classroom. The researcher studied if the dual language classroom had a superior effect on English learners' learning than in a monolingual classroom. Developing English learners, according to the district EL handbook policy are students that require 30-minutes, five times per week of English language development (ELD) instruction (Department of Learning and Teaching, 2023). An example of a developing student is one who has some general and specific language in the content areas, can expand sentences further than just one or two with speaking practice or written paragraphs to visualize the information, and has some written or

speaking errors that do increase miscommunication when the student has to hear and accomplish more than two-step commands, directions, or questions (Young, 2023). These students need content in written and oral form as well as the utilization of graphic organizers and hands-on activities (Young, 2023). Developing students are also able to interpret mathematical explanations as well as construct mathematical explanations that produce nouns to identify the concepts of multiplication. Students are also able to learn the language of relating verbs to define and describe concepts in multiplication, and use mathematical terms "to describe concept, process, purpose, or action" (WIDA, 2020, p. 92).

In relation to the studies that have been conducted, the majority of English language learner development have been focused on reading and comprehension due to the high vocabulary associated with reading. However, lack of mathematic exploration in current research increased the researcher's interest to understand how teachers can utilize ELLs' language in the monolingual mathematics classroom. The researcher studied if having academic vocabulary words translated for four weeks helped ELLs better understand the content in the unit to succeed on assessments.

Theoretical Framework

For the purpose of this research on assessing mathematic scores in a dual language third-grade classroom compared to a third-grade monolingual classroom is the theoretical framework by Jim Cummins and the Common Underlying Proficiency (CUP) theory. This model is used to support the theory that students perform better when both the L1 and L2 literacy skills are being used within the classroom (Cummins, 2000). Cummins (1984, 2000) as stated in Franson (2015), states that the base of this theory is that students who learn their first language (L1) will be able to transfer content amongst other languages (L2), "…that persons who are learning a second

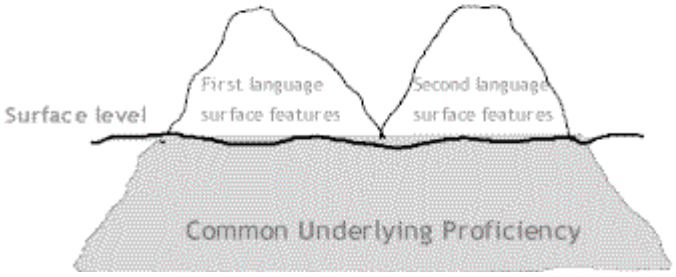
language are not faced with a totally unmapped territory" (Ваютина, 2010, par. 2). Jim Cummins firmly believes that when students' first language is applied, not only does this lay the foundation for academic growth but it also represents value for the students' culture and language (Cummins, 1998). The CUP theory applies the basic interpersonal communication skills (BICS) and cognitive-academic language proficiency (CALP). BICS refers to the developed characteristics of communicative proficiency or, how students socialize in English. It was at the time when Cummins developed BICS, most educators believed this social criterion demonstrated students' academic language because students were able to hold conversations very well in English (Rivera, 1984). BICS was actually created to understand the difference between social language and academic language. This proceeded Cummins to create the theory of CALP to show that if students would understand academic English language in a classroom, they should then be viewed as English proficient (Rivera, 1984). Rivera (1984) explained Cummins CUP theory further explaining,

> Thus, instruction in Spanish in a U.S. bilingual program for language minority students or instruction in French in a Canadian French Immersion program for majority students is not developing only Spanish or French academic skills: it is also developing the general cognitive and academic abilities which underlie English achievement; hence, the rapid transfer of literacy skills across languages observed in these programs (p. 24).

The CUP theory demonstrates that when students use both languages, and although different in their output, concepts are shared, and knowledge is enhanced from both learning and experience (Ваютина, 2010). The CUP theory is also demonstrated by an iceberg which Cummins called the Cummins Iceberg Model of Language. The iceberg shown in Figure 1 consists of two tips.

Figure 1

Jim Cummins' Iceberg Model of Language



Adapted from "Bilingualism and second language acquisition" Franson, 2011, *National Association for Language Development in the Curriculum.* (https://www.naldic.org.uk/eal-teaching-and-learning/outline-guidance/bilingualism/#:~:text=Cummins%20states%20that%20cognitive%20and,underlying%20proficiency%20or%20operating%20system)

One tip represents the first language, and the other tip represents the second language. Cummins wanted to show that we can see the two languages above the surface, which represent BICS, the languages underneath the surface of the iceberg represent CALP (Roessingh and Kover, 2003). Cummins, as stated in Alatis (1980)

> …the 'visible' language proficiencies of pronunciation, vocabulary, grammar, which are manifested in everyday interpersonal communicative situations, are above the surface, but the cognitive/academic language proficiency required to manipulate or reflect upon these surface features outside of immediate interpersonal contexts is below the surface, and, I argue, has usually been ignored in policy decisions regarding language of instruction. (p. 84)

Through the use of the first language and second language, Cummins believed language is informed by working memory, the retaining of information, but the idea of the academics are stored as underlying proficiency because of the transfer of first and second language working together to store academic content (Ваютина, 2010). “With enough time and good instruction, the individuals’ two languages are interdependent and come to exist within one central processing system” (Ваютина, 2010, par. 2).

Overall, Cummins (1997) as cited in Cummins (1998) thought the most important concept in bilingualism were the schools that expect growth and development in English language learners. Teachers must respect the differences in children so that the differences do not become barriers to getting an equal opportunity in education (Cummins, 1998). The common underlying proficiency theory allows the opportunity for barriers to be decreased, and student learning enhanced. This theory will be provided in more detail in chapter 2 and how it will be implemented in the study.

Purpose of the Study

The goal of this research project was to change a third-grade monolingual classroom into a dual language classroom in a monolingual school district and study the effects this change had on English language learners who were identified as *developing* according to the WIDA state standards. The focus on math action vocabulary words determined what would be translated orally in the classroom when the Spanish translator is present during the four-week period. The action words are words used to help students understand whether they should add, subtract, multiply, or divide in a word problem. The researcher hoped that with understanding the action words in both the native language and second language, the assessment scores would be higher. By the end of the quarter, the researcher would determine if having the action words translated in

the classroom for a period of four weeks helped students' performance on the Late Fall aMath FastBridge test. The aMath FastBridge test was compared to peers within the same school district, and a neighboring district with similar classroom diversity. This information was important to understand that in the CUP theory by James Cummins, utilizing the first language to understand concepts better in the second language in fact help English learners excel more than peers in a monolingual classroom. Teachers would also be able to utilize bilingual paraprofessionals, or bilingual teachers to incorporate more push-in models, or small groups to limit the language barrier to understand instruction. Providing teachers with more knowledge on how to foster their students' learning would expect to make an impactful classroom of learners.

Research Question and Hypotheses

This research used a single-subject AB quasi-experimental design due to the small population size being studied. The focus of this study is related to the following question:

RQ1: What is the aMath FastBridge performance difference between developing English learners who were taught in a dual language classroom versus developing English learners taught in a monolingual classroom?

H0: There is no difference in the aMath FastBridge performance difference between developing English learners who were taught in a dual language classroom versus developing English learners taught in a monolingual classroom.

Ha: There is a difference in aMath FastBridge performance difference between developing English learners who were taught in a dual language classroom versus developing English learners taught in a monolingual classroom.

Definition of Variables

Dependent Variable: aMath Performance

Constitutive Definition: aMath performance is a norm-referenced standardized test. “The key goal of norm-referenced assessment is to identify how a student performs compared to others in a predetermined peer group” (Bielinksi, 2022, para. 8). Math performance assessments help to identify students who are in most need of interventions or more help (Bielinksi, 2023).

Operational Definition: The variable specifying math performance is the aMath FastBridge assessment all third-grade students take during the late Fall.

Independent Variable: Dual Language Classroom versus Monolingual Classroom

Constitutive Definition: Dual language programs “is for students to develop language proficiency in two languages by receiving instruction in English and another language in a classroom that is usually comprised of half native English speakers and half native speakers of the other language” (U.S. Department of Education, n.d.).

Operational Definition: The dual language classroom was instructed in a 50:50 model during the 20-minute whole group mathematical time focusing on math action words to multiply as well as the strategies used in multiplication.

Moderator Variables: Moderating variables “influence the strength of a relation between two other variables…” (Hoy and Adams, 2016). The moderating variables for the study are listed below.

a. What do you like about school?

    a. Student questionnaire pre-test interview Q1

b. What would you change about the school if you could?

    a. Student questionnaire pre-test interview Q2

c. What language do you speak most in school? Why do you speak that language?

a. Student questionnaire pre-test interview Q3

d. What language do you wish you could speak the most in the classroom? Why do you feel that way?

a. Student questionnaire pre-test interview Q4

e. Do you feel confident in school? Do you feel that you do well on schoolwork? Why do you feel that way?

a. Student questionnaire pre-test interview Q5

f. What did you think when your math classroom had someone speak a language you know? How did it make you feel?

a. Student questionnaire post-test interview Q1 and Q2

g. How did this change the way you worked in the classroom?

a. Student questionnaire post-test interview Q3

h. Is this (dual language classroom) something you wish you had all of the time? Why or why not?

a. Student questionnaire post-test interview Q4

i. What do you want to tell your teacher about having both Spanish and English in the classroom?

a. Student questionnaire post-test interview Q5

j. Was it easy to learn Spanish, or were there words you did not understand?

a. Student questionnaire post-test interview Q6

Constant: English Language Learner

Constitutive Definition: English language learners (ELLs) are students who come from diverse families with different needs relating to academics, social-emotional support, and language skills (Colorín Colorado, 2023). English learners have limited-English-proficiency (U.S. Department of Education, n.d.).

Significance of the Study

One cannot deny the encouraging academic achievements Cummins and the Common Underlying Proficiency have proved to be true. Providing students an opportunity to speak their native language in the classroom to benefit their overall academic knowledge is a need within a highly diverse English learner classroom. Dual language classrooms make an impact; however, this study was needed within the monolingual school district in order to move forward to show reason to use bilingual paraprofessionals and bilingual teachers effectively to help close the opportunity gap that continues to grow because of the English only assessments. There is a lack in research showing that a dual language classroom can be provided to bilingual students who have never been in a dual language classroom before and make a positive impact in student achievement as well as student social emotional learning. Transfer is not a quick process, however, being exposed to both languages effectively by educators is the factor relying on growth in bilingual learners (Reljíc et al., 2015). Determining if the variables from the research questions prove to be true, more opportunities evoke ways to help language learners succeed each year and grow more in the school district.

Limitations

The researcher's study was limited due to the translation of classroom content. A translator for the district, as well as a practicing student for a teaching English as a second

language license, was able to use her knowledge from observing in a classroom to deliver a lesson with the teacher. Although the translator, teacher, and researcher worked together to plan the delivery of instruction, a bilingual educator would be most ideal because of the educational preparation to teach and knowledge of each student prior to translating in the classroom. Time on whole group math was a significant factor in terms of translating math action words. The teacher had thirty minutes to instruct, inform, and practice math content with the whole class in both Spanish and English for the first time.

Delimitations

Delimitations to the study were students who are not known to be academically bilingual, but determined to be bilingual because they hear and speak Spanish at home with family members, and English in the classroom. This was determined by an interview between guardians and participants. The researcher was also able to ask previous English as a second language (ESL) teachers the background information regarding the student's proficiency in the native language.

Other delimitations of the study were the consecutive four-week period to learn math action words and apply them in the classroom before the assessment. Although students were regularly practicing math action words, students were not assessed until the end of the quarter. This quick turn-around may have hindered the students' achievement and ability to perform well on the assessments.

The final delimitation of the study is that research does not specify which group of EL students would benefit better in a dual language classroom. As it was stated previously by Cummins in Reljíc (2015) that the amount of language known prior does not matter. However, the researcher only focused on students who were developing in the English language, had

similar backgrounds, as well as the assessment score needed for the study in the aMath FastBridge tests from spring 2023.

Research Ethics

Through this entire study, ethical considerations were maintained. Approval from the Institutional Review Board (IRB) was obtained and the letter is found in Appendix B. Anonymity was maintained throughout the entire research process. The researcher was granted the ability to conduct the research in School A and School B by written approval from the administration of both schools. All participants were mailed a consent form in both Spanish and English informing the parents their child was selected for the study. Each consent form was translated into Spanish. Letters were sent to all the family members with children learning in the dual language classroom to inform them of the research being conducted. The researcher also sat down with the family members participating in the study at back-to-school conferences. Families were allowed to ask questions, concerns were taken into consideration and addressed, and they were given full awareness of what the quarter would look like. Throughout this process, the researcher valued the academic performance of all the students and maintained the anonymity of the participants.

Conclusion

Chapter One provided the reader with the historical overview of language instruction for non-English speakers, who non-English-speaking immigrant children are, twenty-first century evidence-based instructional practices for ELL students, the purpose of the research and the questions pertaining to what the researcher wanted to know in this study. While dual language programs have shown to have a positive impact on language learners' academic achievement in the classroom, this study is important to conduct for the purpose of the monolingual school

district where the researcher resides. There is little research showing that students who have never been in a dual language classroom, can excel in mathematical assessments when provided a dual language classroom in the third grade. This information helped the researcher develop enriched ideas of the best practices to foster learning in the highly diverse monolingual school district. Chapter two provides the reader with the extensive literature review describing methods already achieved to understand how language learners process information in the classroom. Chapter two also describes the Jim Cummins' Theory of Common Underlying Proficiency which is the driving force for this research to determine if students gain more background knowledge in their first language, it will help foster development in the second language. In Chapter Three, the process for conducting this study is provided in detail. Chapter Four contains the findings of this study, and finally, Chapter Five summarizes the research process, conclusions, and recommendations to further advance this study. The references and appendix finalize this study.

CHAPTER 2. LITERATURE REVIEW

There is a significant need to explore the importance of dual language programs versus monolingual programs, especially in areas where communities in the United States (US) are growing in the diversity of languages spoken by their habitants. In the Worthington School District where the researcher is a current third grade teacher of English as a second language, 29 languages are spoken across K-12. Spanish is the dominant language spoken by 1,660 students while English is the second most spoken language among 1,162 students (Young, 2023). According to Patterson et al. (2019), dual language learners are students who are learning English and another language, and these learners have increased by 24 percent since 2000. Serving such a language diverse population comes with many challenges for professionals in a monolingual school district. Lack of proficiency in the students' first language in order to communicate basic needs is one significant challenge. This is crucial when developing relationships with students and accurately identifying what they need, answering questions they have, and providing directives about what they should do every day. Another challenge is related to the development of academic content in the classroom to succeed and grow. When teachers cannot speak the native language to help English learners (ELs) with academic strategies the learner may get frustrated and begin to develop a negative feeling towards the learning process in general and the school in particular. Effectiveness of English language learner instruction in monolingual programs as compared to dual language programs have shown that dual language programs increase ELLs' academic learning at a faster rate than in a monolingual program because students have the ability to use both languages to switch between tasks focusing on the different content (Lü, 2020). "Because of the cultural and linguistic differences of these children, it is essential to study teaching practices at the early childhood level" (Kelly, 2015, p. 1). By

supporting English language learners' usage and growth of their own language in school, they are better equipped to understand the concepts that are taught in school.

In the district where the researcher works, the most commonly used pedagogies to teach English language learners are push-in or co-teaching models and the pull-out model. Push-in or co-teaching is when the classroom teacher and second language teacher work together to create lessons. The language teacher focuses on the academic content of the lesson and can address the vocabulary and language terms during a class period. Pull-out instruction is generally for new-to-country students who are taken out of the general education classroom to work on English language development. Due to the significant number of English learners in the district, the researcher wanted to utilize the resources available to the district and use Jim Cummins' Common Underlying Proficiency (Franson, 2011) theory to help English learners develop academic content. The researcher wanted to see if using the first language as Cummins' states in his CUP theory, helps the rate of progress on academic classroom content in the English language learners' second language development in the monolingual school district.

A Historical Overview of English Language Learners in American Schools

More than 86 million people legally immigrated to the United States between 1783 and 2019 (Baxter and Nowrasteh, 2021). The wave of immigration began during the colonial period between 1607 and 1776. During this time, people were either forced into immigration due to slavery or transportation, while others voluntarily came from European countries which was under British law. "Citizenship was one of the earliest issues that American politicians grappled with" (Baxter and Nowrasteh, 2021, para. 12). According to Brisk (1982), (as cited in Brown, 1992), there were more than seven language groups in this early migration period to the United States and through the 19th century. Immigrants were pushed to replace their culture with a

more “American” one and students in school were placed into English only classrooms (LCMCSID, 2023).

By the year 1830, there were 599,125 immigrants in the U.S. from Europe, Asia, Central America, South America, and Africa who established lawful permanent residence in the United States granted to them (U.S. Department of Homeland Security, 2018) by filing a declaration of intention (U.S. Citizenship and Immigration Services, 2020). This number jumped to 4.9 million by 1860 with immigrants primarily from Europe and Ireland (U.S. Department of Homeland Security, 2018). In 1891, The Immigration Act was first passed. Various changes took place before the Immigration Act of 1924 limiting methods for individuals to obtain visas and residency in the U.S. (Immigration History, 2019). During the19th century period, school districts “wherever immigrant groups possessed sufficient political power” (Crawford, 1987, para. 11) had allowed other languages to be taught as a separate course or integrate as linguistic and cultural traditions.

During the Great Depression which lasted from 1929 - 1939, it was thought that deporting illegal immigrants would allow more job opportunities for Americans native to the U.S. However, Johnson (2005) stated “in this repatriation, approximately 60 percent of the deportees were U.S. citizens, many of them children having been born in the United States to Mexican parents” (p. 4). At the end of the Great Depression, in 1939, World War II (WWII) began. Due to the limited work on farms, the United States sought out help from its neighboring country, Mexico, to provide the help America needed on the farms. It was during this period that the federal government developed the Mexican Labor Program, *Bracero Program,* in 1942 (Library of Congress, 2019). This program allowed 4.6 million Hispanic laborers between 1946 and 1964 to work on farms where the work was limited due to the war

(UCLA Labor Center, 2014). Children with parents in the Bracero Program enrolled in more secondary education courses or dropped out of school by the time they could work in the Bracero Program to help their family (Barcena, n.d.) In the years after the Bracero Program, developing different ways to extend, provide, and give green cards to individuals and family members was looked into by the Nationality Act (Baxter and Nowrasteh, 2021). By 1980, the Refugee Act allowed an increase in asylum seekers, as well as updated the Nationality Act to comply with the 1967 United Nations Protocol Relating to the Status of Refugees. In 2021, there were 11,454 refugee arrivals (Homeland Security, 2022).

By 1990, 7 percent of green cards were from individuals coming from Europe, 22 percent from Asia, and 59 percent from either Mexico, Central America, or South America (Radford and Noe-Bustamente, 2018). A green card gives a person the ability to live and work permanently in the United States (U.S. Citizenship and Immigration Services, n.d.) In 2012, President Barack Obama revealed the Deferred Action for Childhood Arrivals (DACA) program. This program allowed a two-year work permit and pardon from deportation to undocumented immigrants who met the DREAM Act requirements. This act protected immigrants who came to the U.S. as children, but are vulnerable to deportation (American Immigration Council, 2021). In 2012, approximately 10% of student populations in schools identified students as English language learners (Breiseth, 2015). Baxter and Nowrasteh (2021) added that in 2014, Obama issued the Immigration Accountability Executive Action, which granted three years of temporary revocable relief and work authorization for four to five million illegal immigrants by expanding DACA to cover the parents of children who were U.S. citizens. In 2022, a total of 6,815,120 nonimmigrant visas were issued (U.S. Department of

State, 2022) and a total of 493,448 immigrant visas were issued with more than half being for immediate relatives and family sponsored (U.S. Department of State 2022).

English language learners come from a variety of backgrounds in terms of language, culture, immigration/visa status, time spent in the United States, and level of exposure to formal education (Center for Educational Effectiveness, 2022). ELLs may understand processes and content occurring within a regular education classroom when placed into a public school system, but they do not have the academic language in English to express this knowledge yet. According to the Annie E. Casey Foundation (2023), a foundation dedicated to providing children with a quality future, nearly half of youth in immigrant families live in low-income households as well as 12% living in high-poverty areas. Nationwide, 91% of fourth graders who were also English language learners scored below proficient in reading. The foundation also noted that in 2019, 18% of children lived in linguistically isolated households where a person age 14 or older who speaks English as a second language speaks it proficiently.

According to the Minnesota Department of Education (MDE), an English learner is:
A student in kindergarten through grade 12 or a prekindergarten student enrolled in an approved voluntary prekindergarten program under section 124D.151 or a school readiness plus program who meets the requirements under subdivision 2a or the following requirements: 1) the pupil, as declared by a parent or guardian uses a language other than English; and 2) the pupil is determined by a valid assessment measuring the pupil's English language proficiency and by developmentally appropriate measures, which might include observation, teacher judgment, parent recommendations, or developmentally appropriate assessment instruments, to lack the necessary English skills to participate fully in academic classes taught in English (MDE, 2020-2021). According to the National Center for Education Statistics (NCES, 2022), in the fall of

2019, Texas, California, and New Mexico reported the highest percentage of English learners in public schools with 19.6%, 18.6%, and 16.5% respectively (NCES, 2022).

As of 2020, MDE reported 893,203 K-12 students were enrolled in Minnesota public schools. Of these students, 76,361, or 8.5%, were identified as English language learners. “The data indicates enrollment of ELs has remained fairly consistent since 2016 in the percentage of students identified as ELs” (MDE, 2021, p. 13). From this group of English learners, 339 different home languages were reported using the Minnesota Automated Student Reporting System (MARSS), showing an increase of 39 languages from 2018-2019 school year, being Spanish the primary home language.

The journey to America is different for each family. When English language learners (ELLs) move from one country to another many factors affecting students’ social, emotional, and psychological well-being is affected (Brown, 2020). Culture shock impedes ELLs’ academic abilities (Brown, 2020). There is a misconception that immigrants are willing to abandon who they represent in their culture in order to be American (Wright, 2019). Another assumption made is that immigrants must give up their home language and culture to become Americans. Children often leave behind a loved one in hopes of seeing them one day again. Others may be contained in holding centers at the borders alone, scared, and helpless waiting for someone to accept custody.

History of Dual Language Education

In the early years of learning a language, schools were established to serve their own people, while also teaching English as an added subject (Brown, 1992). In 1839, Ohio became the first state to adopt a bilingual education law, authorizing German-English instruction at parents’ request (Rethinking Schools, 2023). Louisiana also did the same with French and

English in 1847 and in 1850 the New Mexico Territory developed a similar bilingual education law to learn Spanish and English (Rethinking Schools, 2023). “In fact, beginning in the 1850s, many states passed laws prohibiting interference with home-language instruction or use in public schools” (Brown, 1992, p. 3). This meant the knowledge of knowing the home-language was so important to students that it could not be taken away or limited. However, in 1914, World War I (WWI) negatively impacted bilingual education law because although the change was supposed to boycott German, using anything but English meant weakness (Baron, 2014, para. 4). This change of English-only in classrooms caused havoc by the mid-1920s when limited English proficient (LEP) students in America fall behind peers who were native to the English language (Rethinking Schools, 2023). “English-only instruction continued as the norm for LEP students until its failure could no longer be ignored. LEP students in English-only classrooms were falling behind in their academic studies and dropping out of school at alarming rates” (Rethinking schools, 2023, para. 5). This demand for English-only instruction continued through World War II. It was not until after World War II that pluralist individuals who value diversity, made a stance in education for a change in diversity amongst schools (de Jong, 2011). The pluralists recognized the decrease of languages and cultures due to the legal limitations that had continued to influence societal and educational practices through World War II (de Jong, 2011). Through these efforts and efforts of the civil rights movement in 1954, the Supreme Court case *Brown v. Board of* Education made a vast impact on making education equal (de Jong, 2011). Bilingual education pilot programs were funded by the federal government and private foundations in the early 1960s (Brown, 1992). In 1968 The Bilingual Education Act (BEA) was created as the first official federal recognition of the needs of students with limited English proficiency. In order to provide federal funding to help school districts deliver new forms of educational programs for

students who were ELLs, the Title VII of the Elementary and Secondary Education Act was put into place (Lindholm-Leary, n.d.). The BEA focused on low-income nonspeaking and limited English-speaking students as there was no definitive definition of what the BEA required (de Jong, 2011). “The Bilingual Education Act has been considered the most important law in recognizing linguistic minority rights in the history of the United States” (Nieto, 2009, p. 63). Over time, the Bilingual Education Act made several changes to provide ample opportunity for English language students and the instruction they deserved. The BEA lacked explicit instruction for how to assess ELLs in order to determine how a program was successful (Nieto, 2009). In 1973, a San Francisco school neglected to provide EL instruction to almost 1,800 Chinese non-English speaking students (U.S. Department of Education, 2020). This case known as Lau v. Nichols was significant in creating awareness of language barriers and the notion that the teaching of English should be American educators’ responsibility and not the responsibility of parents and children (Nieto, 2009). By the 1980s, the U.S. government was interested in more ways to develop English language for ELLs and expanded bilingual programs including two-way and dual language programs (Lindholm-Leary, n.d.). There was also funding through Title VII to improve instruction in already established bilingual programs and provide scholarships for bilingual teachers to enhance classroom instruction (Lindholm-Leary, n.d.). In 1994, the BEA was reapproved to make its main purpose “developing bilingual skills and multicultural understanding” (Crawford, 2004, p. 19). Into the new millennium, growth of dual-language programs excelled. What was once dual-language education for learning only English has now advanced into dual-language programs for a variety of languages to help our students succeed academically and socially in education. “Imagine a nation in which all children have access to high quality two-way/dual language programs and all children could become bilingual, biliterate,

and educationally successful" (Lindholm-Leary, n.d., p. 16). This is a human rights issue for children living in America and who are learning to speak English.

Language Acquisition

First Language Acquisition

Researchers have developed countless efforts to determine how children produce language even before the child is able to make sense of the words to put them into sentences (Fromkin et al., 2014). "Newborn babies are unable to speak, but by the time they are five years old (assuming no cognitive or developmental disorders), they have a fully developed language system" (Wright, 2019, p. 51). Infants can already distinguish between different articulation and stressed syllables in voices which allows them to learn the language they are hearing every day (Fromkin et al., 2014). "Babies bring a preference for their mothers' voices out of the womb with them" (Kohn, 2020, para. 3). Newborn babies can decipher the syllables and rhythms to speech which is why the newborns pay more attention to speech in the language they are used to versus a foreign language being heard (Kohn, 2020). At about six months, the earliest stage of language acquisition occurs as infants begin to babble making no production of words but "the twelve most frequent consonants in the world's languages make up 95 percent of the consonants infants use in their babbling" (Fromkin et al., 2014, p. 400). After the first year, children begin to develop one utterance words from the sounds they repeatedly hear to represent an entire phrase (Fromkin et al., 2014). The small set of sounds children produce in this beginning stage is similar throughout all languages. It is not until later in the stage of development that children distinguish the sound of their own language (Fromkin et al., 2014). Within the first six years, a child will produce about 14 words a day making a combined 5,000 words per year (Fromkin et al., 2014). In a study conducted by Hart and Risley (2003), the researchers found that children who came

from a low-income poverty family would have at least a 30-million-word gap from children in a professional family. By the second year a child will begin to put two words together to create meaning to their needs or surroundings. This development begins to produce the knowledge of a subject and predicate while also learning the meaning of using the correct forms of *he, she, I, you,* and so forth (Fromkin et al., 2014). The ability of a child's brain to respond to class content allows them to use both the left and right hemisphere to learn a language as compared to an adult who uses only one (Nacamulli, 2015). As the child continues to grow and develop, key developmental factors are from the target adult language. "Though the stages of language development are universal, they are shaped by the grammar of the particular adult language the child is acquiring" (Fromkin et al., 2014, p. 419).

Second Language Acquisition

Second language (L2) acquisition refers to the language being acquired by someone who has already developed all the language skills (L1). First language skills are generally acquired by the age of six, the time children go to school (Crowley and Houts-Smith, 2010). "Second-language acquisition assumes knowledge in a first language and encompasses the process an individual goes through as he or she learns elements of a new language, such as vocabulary, phonological components, grammatical structures, and writing systems" (Robertson and Ford, 2009, para. 3). English learners also go through the same stages as they did in their first language such as the babbling stage, making words, developing sentences, and so forth. "Like L1ers, L2ers also attempt to uncover the grammar of the target language, but with varying success…" (Fromkin et al., 2014, p. 432).

Cognitive perspectives of second language acquisition (SLA) have been greatly influenced by the work of Stephen Krashen since 1980, studying how the brain learns a new

language. Cognitivists believe the language learner develops a second language through a subconscious process. The child is unaware that he or she is developing a new language in a predictable order (Wright, 2019). Cognitivists also believe that when teachers make a child work on repetition and knowledge of grammar before the child is ready to learn, the child will not be ready to learn and retain. Krashen also believes that children are able to monitor their own errors in the second language and have the ability to correct the errors before the child expresses them. For example, in a conversation, the child cognitively finds the correct word for the second language and produces the correct sentence and words. This comprehension of a second language is what cognitivist believe drives the language learner to eventually understand the second language (Wright, 2019).

The sociocultural perspective on second language acquisition believes external factors are associated with the learning process of the English language learner. Wright (2019) states,

> Sociocultural perspectives have been growing in popularity because they help teachers consider and address the linguistic and cultural diversity of their students, the languages and literacies their students use at home and in the community, and the languages and literacies needed for success in learning English and academic content at school and beyond (p. 57)

The sociocultural perspective comes from work conducted by Lev Vygotsky and the concepts of zone of proximal development (ZPD) and scaffolding. Vygotsky believed that L2 learning occurs when the student interacts with adults and other children who are knowledgeable and can help the EL achieve progressively higher level of performance (Wright, 2019). “The sociocultural perspective emphasizes speaking and collaborating in learning a second language

and thus has opened the way for researchers to focus on collaboration and interaction as key to language learning and teaching" (Wright, 2019, p. 59).

Basic Interpersonal Communication Skills and Cognitive Academic Language Proficiency

Basic Interpersonal Communication Skills (BICS) "refer to linguistic skills needed in everyday, social face-to-face interactions" (Colorín Colorado, 2019, para. 2). This is the language needed to talk with friends, have conversations with teachers, and communicate the needs of everyday life. Examples of this language are, "Hi, how are you?" "Can I get a drink?" "It is cold outside, do you think so?" This communication skill takes six months to two years to develop and does not relate to high levels of literacy (Teemant & Pinnegar, 2007). Cognitive Academic Language Proficiency (CALP) "focuses on proficiency in academic language or language used in the classroom in various content areas" (Colorín Colorado, 2019). A considerable body of research shows that for the vast majority of children it takes from two to five years to develop oral proficiency in English and four to seven years to develop proficiency in academic English (Fromkin et al., 2017, p. 307). Examples of academic content are words such as first, next, then, and last, as well as words used to understand word problems using academic vocabulary terms like how many, in all, equal to, and sum. Cummins (2021) writes,

> The points of distinguishing conversational fluency from academic language proficiency was not to deny either the complexity or major variation in conversational interactions but rather to point that (a) all normally developing speakers (or signers) of any language develop the ability to use this language to attain their goals in everyday social contexts, and (b) the variation across individuals in various aspects of conversational fluency (e.g. accent, speed of syllable production, etc.) is not directly related to individual differences in the development of literacy-related aspects of language(s) in school (p. 46)

It is important for educator to understand the difference between BICS and CALP in second language acquisition to develop language skills that promote English language learner academic success.

P-12 Program Models

Within a P-12 setting, classroom teachers and English language teachers can work together to make content more comprehensible for ELLs. Different models of instruction that exist are:

1). Transitional bilingual education (TBE), a program that provides content-area instruction in the students' home language to quickly get the students into the classroom;

2). Developmental bilingual education (DBE) which are less common due to the lack of funding and are taught by qualified bilingual teachers;

3). Dual language education which provides literacy and content instruction to all students using both languages;

4). Bilingual immersion programs target English-speaking students with the goal for English speakers to become bilingual and biliterate;

5). Heritage language programs are used to develop proficiency in the student's heritage;

6). Pull-out English as a second language instruction which is used to help ELs increase their level of English proficiency, a commonly used model in elementary classrooms;

7). In-class English as a second language instruction allows ELs to hear instruction and content with their peers;

8). Sheltered (structured) English immersion (SEI) programs have classroom teachers who are trained and certified to provide language and content instruction for EL students;

9). Newcomer programs which are specified for newly arrived students for only a limited time before being placed into a different instructional model; and finally,

10). Submersion (sink or swim) program is when EL students are placed into a mainstream classroom and no support is given at all (Wright, 2019. p. 102-116).

For the purpose of the study, the researcher studied the in-class English as a second language instructional model. While the best outcome would be for the classroom teacher to be trained and certified to teach English as a second language (ESL), the EL teacher goes into the classroom to help provide instruction during whole group class time. This model is then called push-in. One important reminder during this instruction is that both teachers work and collaborate together in order to provide instruction in the classroom. Wright (2019) states,

> The ESL teacher can serve as a valuable resource to the classroom teacher, helping her recognize the language demands of upcoming lessons and activities, setting appropriate language objectives, and offering advice and demonstrations of how to make modifications and provide effective scaffolding and accommodations" (p. 115).

In order to help and English learner comprehend mathematic instruction better teachers can make word charts, hands-on practice with manipulatives, bilingual strategies and technology. In order to assess these items, criterion-referenced tests are used more often in school districts because it allows teachers to monitor student progress. It also allows teachers to understand how well a student did in answering the questions or mastering the content.

Dual Language Classrooms

In dual language programs, the partner language (e.g., Spanish, Mandarin, Korean) is used for a significant portion (from 50% to 90%) of the students' instructional day (Lindholm-Leary, 2012). In both groups of students, the goals include high levels of bilingualism and

biliteracy, academic achievement, and cross-cultural competence for all students (Lindholm-Leary, 2012). The most important element in a bilingual classroom is that all students succeed, not just the dual language learners, emergent learners, and native English speakers, but all students. According to Lindholm-Leary (2012), the amount of time spent in each language varies across the grade levels in the 90:10, but not 50:50. The model using 50:50 is seen as a one-way dual language education model fitting the needs of the majority language student population. Goals for the dual language program is still the same, as well as closing the achievement gap between ELLs and native-English speakers. Whatever mix of English and Spanish proficiency is present among the student population, an enrichment dual language program brings these students together to teach each other the curriculum through their two heritage languages (Collier & Thomas, 2004, p. 2). A two-way dual language education program in the United States represents 90% of the instruction in the students' native language (predominantly Spanish) while the remaining 10% is in English. This ratio is seen in the younger elementary grades. As a student progresses and moves to higher grades, the native language is used less, and English is increased. This increase in English proves to demonstrate that students in DLE programs perform at or above grade level on standardized reading and mathematics tests in English (Lindholm-Leary & Borsato, 2006).

In a study completed by Patterson et al. (2019) performance on a dynamic assessment (DA) was used to determine if year-end performances were related to language achievement from dual language learners from Spanish-speaking homes. In a preschool classroom, 20 four-year-old, 10 boys and 10 girls, from a Southwestern metropolitan area of the United States participated in the study. Students who came from homes where Spanish was spoken more or the same as English were selected. All students in the study, with the exception of one, heard

Spanish more than English with the primary caregiver in the home. Both Spanish and English language were heard within the Head Start classrooms because either the teacher or paraprofessional spoke in Spanish to the students as well as using English.

During the test, tasks such as the instructions, prompts, and feedback were given in Spanish because of the overall language heard most often at home. Correct responses could be in either English or Spanish. Students were given three dynamic language assessment tasks which were Novel Adjective Learning (NAL), Prediction, and Similarity Function (SF). These three tasks determined how much a student understood the English language to succeed and carry-on further English after the Head Start program. The research showed that two out of the three tasks were positive in year-end language growth. However, the researchers were concerned the tasks for SF and Prediction were too easy because they were similar in the structure of the lessons.

In a meta-analysis study completed by Relijic et al. (2014), the researchers sought to show the success of bilingual programs and how they could improve academic achievement amongst multilingual learners (MLLs) in Europe. Lorenz et al. (2021) stated “the most recent curriculum in primary and secondary education in Norway now acknowledges the relevance and value of multilingualism” (p. 2). Relijc et al. (2014) also noted that countries who supported language programs had the smallest academic achievement gaps. In order to conduct this meta-analysis study, Relijc et al. (2014) used specific criteria which included: 1). Focus only on European studies, 2). Statistical data, 3). Quantitative instruments such as standardized tests, and 4). Participants were not in special education. The total number of comparisons for the meta-analysis was 70. Of these 70 comparisons, only two focused on a bilingual program for mathematics, while the rest were grouped into reading. “The findings of the present meta-analysis are in agreement with those of previous meta-analyses in favoring bilingual education

that uses the home language of language minority children in the instruction of school subjects to promote their academic achievement" (p. 120).

Ultimately the data showed that promoting a student's home language within the classroom will help the student develop academic language skills than a monolingual program. Kluger (2013) shares that the bilingual brain is not necessarily a smarter brain, but it is proving to be more flexible, more resourceful one. To prove this statement even further, Krashen (1997) suggests that when schools provide students with quality education in their primary language, they give them two things: knowledge and literacy.

Math Performance

Although many assumptions have been made regarding math and its simplicity for ELs, this is untrue. Avalos et al., (as cited in Wright, 2010) state "educators and researchers have analyzed the language of math and found that it has a unique vocabulary and syntax and unique semantic properties and text features" (p. 279). Mathematics plays an important role in developing knowledge in other school subjects such as science and social studies (Park, et al., 2023). Specifically in third grade, students are taught all four operations (addition, subtraction, multiplication, and division) in order to solve word problems. "Third grade is a flagship year for math, as it's the bridge from simple computation to more complex skills" (The Woods Private School, 2024, para. 5). This cognitive stage of development is seen as Jean Piaget's concrete operational stage. Within this stage, growth is excelled based on the development of language and acquisition of basic skills. As stated by Ojose (2008), "children at this stage of Piaget's development utilize their senses in order to *know*; they can now consider two or three dimensions simultaneously instead of successively" (p. 27). However, when considering how English learners identify concepts in a math classroom, the order of acquisition for first language

acquisition is not identical to the order of acquisition for second language (Office of Bilingual Bicultural Education, n.d.). There are many influences that may impact the cognitive development of third grade English learner students to learn academic content. In a study conducted by Barac, et al. (2014), the researchers compared the performance on the Stanford-Binet Scale of Intelligence. This assessment tests intelligence through five factors of cognitive ability which include fluid reasoning, knowledge, quantitative reasoning, visual-spatial processing and working memory. Over one thousand English monolingual and Welsh-English bilingual school-aged children from rural and urban backgrounds in Wales were a part of this study. Variables that were considerably flawed in the outcome of the test were not properly matching the students to their age, gender, and socio-economic status, the test was conducted in one language, bilingual children varied in their ability to comprehend information, and bilingualism was assumed based on the child's parents' names and country of birth (Barac et al., 2014). As stated in Reardon (2011) by Wright (2010), "the income gap between high- and low-income families has widened since the early 1960s and that the academic achievement gap between students from high- and low-income families has also widened" (p. 13). Researchers Capps et al., (2005) found that in the year 2000, 68% of ELL elementary school students were considered low-income, and 35% had parents with less than a high school degree.

When compared with other groups of English language learners, Spanish children have shown to have lower mathematic scores on national assessments over several years (Swanson et al., 2018). According to the National Assessment of Education Progress (NAEP) (2022), the NAEP mathematics assessment measures students' knowledge and skills in mathematics and their ability to solve problems in mathematical and real-world contexts. According to NAEP, Minnesota fourth grade students in 2022 scored four points higher than the nation's public

schools, however, scored almost 10 points lower since 2019. ELLs in Minnesota showed an average score of 219 compared to non-English learners with 253 in 2019, and a significant decrease in scores in 2022 of 206 versus the 244 of non-English speakers. Significant difficulties of math in the elementary grades have been shown to have detrimental effects on high school performances (e.g., drop rates) as well as later employment (as cited in Swanson et al., 2018).

Working Memory and Math in Bilingual Students

Working memory (WM) is the ability to retain a small amount of information and use it correctly in the given moment during a lesson as compared to retaining the information long-term (Cowan, 2014). According to Adesope et al. (2010), bilingualism in children is associated with improved domain-general skills, such as working memory. This is important for learning in areas such as mathematics in the general education classroom. Although studies that examined the relationship between bilingualism and WM in children are rare, they are particularly relevant to young bilingual students' comprehension of math (Daubert & Ramani, 2019).

Swanson (2018) has conducted various research on working memory in the bilingual student. In 2018, Swanson et al., wanted to determine if growth in the executive component of WM predicted growth in math performance in children who vary in bilingual proficiency. Swanson et al. (2018) indicated "there are cognitive advantages to increasing second language (L2) proficiency, namely, bilingualism, one would expect a strong relationship between WM and math as ELL children become increasingly proficient" (p. 7). However, bilingual children with math difficulties (MD), and limited language in their first language (L1), would fall further behind their peers who are proficient in their first language. Swanson et al. (2018), researched students' ability to remember visual sequences within a matrix and a sequence of directions on a map. The final test determined how well ELLs could think and act when having an external

factor present that could have disrupted their learning. The results of the study proved that WM in students who were proficient bilinguals outscored peers significantly who were less proficient bilinguals. The important concept is that WM improves in bilingual students when they are proficient in their first language and then placed into a bilingual classroom.

In another WM study by Swanson et al. (2019), the researchers wanted to investigate if the *structure* of WM in ELL children varied across age and two language systems because the researchers believed "the structure of WM depended on the phonological loop, which is the temporary storage of verbal information and visual-spatial sketchpad" (p. 174). Swanson et al. (2018), had previously researched and proved proficient bilinguals WM exceeds individuals with less proficiency in their L1. The results of the study did find that bilingual children experienced some advantage related to the executive system. "The relationship between English and Spanish is that as ELL children grow, they are able to achieve language-specific selection *without* inhibiting their L1" (Swanson et al., 2021, p. 24).

In another study completed by Swanson et al. (2021) the researchers sought out to investigate working memory growth and its prediction in mathematical problem-solving growth among emergent bilingual children between two time periods. However, in this study of emergent bilingual students, the models were unable to predict English mathematical word-problem solving, but it could predict the ELLs' Spanish world-problem solving. This may have been due to the lack of proficient English emergent bilingual students have. The researchers found that short term memory (STM) played an important role in the executive processing of English mathematical word-problem solving as well as the WM being affected positively by language-dependent, long-term knowledge (Swanson et al., 2021). Swanson et al. (2021),

reiterated the importance of working with English learners' L1 in order to develop the L2 effectively and see success with word problem-solving skills.

Academic Performance Assessment for ELL

Pica (2015) states "standards are written by people with little to no knowledge of child development or developmentally appropriate practice" (p. 7). In the Intermediate school in Minnesota where the researcher identified the study overall, 176 students in grade 3 completed the 2022 Minnesota Comprehensive Assessment (MCA). Of these students 38.1% met the standards. Additionally, 5.7% exceeded the standards, 26.7% partially met, and 29.5% of the students did not meet (Viewpoint, 2022). Of the students who did not meet and partially met, 65 or about 37% were English learners.

According to Gottlieb (2016) in Wright (2010), "assessment is the planning, collection, analysis, interpretation, and use of data from multiple sources over time that communicate student performance in relation to standard, learning goals, learning targets, or differentiated learning objectives" (p. 126). Teachers may use a variety of assessments for all to get an accurate picture of how well a student succeeds on content-related tasks. Collier and Thomas (2004) believe that English learners just beginning acquisition of the English language should be tested in their primary language because the child does not have comprehensive knowledge of English yet. Krashen (2000) also validates this statement stating that students' primary language can function as an avenue to make English language instruction and content more comprehensible. Some assessments used in school districts are: 1). Summative which provides a summary, usually at the end of a unit or school year of what the student can do; 2). Formative assessments "informs teachers of what to do next instructionally" (Wright, 2019. p. 127). Formative may also be informal. This means teachers, while walking around the room, get an understanding of how

students are doing in the moment to make further decisions on teaching; 3) Norm-referenced test which are used to compare student's scores to other students; and 4). Criterion-referenced test which determines how much a student has learned by tallying how many questions are answered correctly (Wright, 2019). "The main purpose of content-area testing is to determine how well students are performing in a particular subject area" (Wright, 2019, p. 135). English language students may receive accommodations in these subject areas on assessments to determine what students can do until they have reached full English proficiency. "Unfortunately, research on the validity of accommodations is very limited and the validity of only a handful of accommodation strategies used for ELLs have been experimentally examined" (Shohamy et al., 2017. p. 306).

Assessment Accommodations

Just because an English language learner speaks their first language does not mean they automatically know how to read and write in that language. "Effective teachers of ELLs use their own alternative authentic assessments throughout the school year for both formative and summative purposes" (Wright, 2019, p. 147). Some accommodations to best meet the needs of English language learners are, but not limited to, providing tests in the ELLs' home language, oral interpretation of tests directions and/or test items, test read aloud in English, linguistically simplified tests, bilingual dictionaries, extra time provided, and test administered individually or in small group (Wright, 2019). The most common assessment strategies used in the Intermediate School is to determine understanding and command of the content are aMath FastBridge progress monitor reports which include earlyMath, which assess early numeracy skills, aMath that measures broad math abilities, and CBMmath Automaticity which measures a student's fluency with arithmetic facts (Illuminate Education, 2023). Additional assessments in the district

also include daily work, end of the unit assessments, and math action vocabulary practice within the classroom.

Teacher Preparedness Related to Teaching English Language Learners

Students at the early stages of developing English proficiency often will work with English as a Second Language (ESL) specialists daily either through pull-out or push in models, typically for 30 to 60 minutes as stated in Deng et al. (2021). As English language learners progress in their English skills, they see the specialists less, but still benefit from assistance in the general education classroom. “The major concern in the research literature and in educational settings surround multilingual learners at the earlier stages of developing English proficiencies…” (Deng et al., p. 490). In a study conducted by Deng et al. (2021), the primary focus was teachers’ perception of their readiness to teach multilingual learners. In general, the outcome of the average score of teacher-perceived preparedness was 2.16 on a four-point scale indicating teachers were less prepared to work with multilingual learners. The researchers found that female teachers perceived themselves as being more prepared than male teachers perceived themselves, and teachers who had received instruction in teaching multilingual learners at the undergraduate or graduate level felt more confident to work with ELLs as well. Teachers who also had a higher population of ELLs felt more prepared to teach the instruction to MLL students.

Theoretical Framework

Research has grown vastly in the exploration for the leading ways to educate English learners. Many theories and practices have been conducted on working memory, phonological awareness, and visual-spatial processing. Prior research showed that second language acquisition was dependent on the proficiency in the English learners’ first language. This meant students

who were more proficient in their first language excelled more in their second language (Goodrich & Lonigan, 2017). However, Cummins "introduced the idea of a common underlying proficiency to describe a potential mechanism through which cross-language transfer could occur" (para. 5). In order to guide the research questions and framework specific to what the researcher is challenging, Jim Cummins' Common Underlying Proficiency Theory (CUP) was the guiding support for this study. The CUP theory was also classed Cummins Iceberg Model of Language. Cummins (2021) states "because bilingual children must develop cognitive mechanisms for controlling which of their languages gets used in particular contexts, they develop increased capacity for attending to external stimuli and this may result in better performance on other cognitive tasks" (p. 15). Research in Europe and North America, as well as low-income settings in Eritrea and Ethiopia, have established that there have been much greater gains in learner achievement as well as parent involvement (Cummins, 2021). Cummins made a point that in order for English learners to understand, process, and excel at academic content, their first language (L1) and second language (L2) must be used within the classroom to merge the content to make it comprehensible to succeed. "Although there are surface features of each language that are distinct, L1 and L2 are intrinsically connected" (Goodrich & Lonigan, 2017, p. 783). In order for the common underlying proficiency model to be effective, the English language being used should be comprehensible and transferable to the English learner's first language (Goodrich & Lonigan, 2017). This transfer between the language allowed "evidence of the transferability of language-independent skills (e.g., inferring meaning from text)…" (para. 5). According to Teemant and Pinnegar (2007), if the concepts have been learned in an English learner's first language, then the vocabulary should not have to be retaught when learning the second language. Cummins believed the brain had the ability to process information from a

central part of the brain and utilized the L1 as well as L2 to produce a deeper understanding of the language (Prokopchuk, 2022). The connection between the two languages provides students with a chance to adapt to the culture and feel a sense of belonging instead of being disconnected due to the language barrier. Zelin (2017) notes that there would be fewer conflicts between the two cultures and increased motivation to learn the second language than if the English learner were forced in a monolingual classroom to understand and learn the language. The CUP theory provides a link to the dual language classroom the researcher is going to study because students will be able to hear and use their L1 in order to transfer the knowledge to their L2 making a connection. There is hope this connection provides growth in student knowledge of content in the math classroom.

Research Questions

It is very important to remember the purpose of the research. The goal of the research project is to impact the decision-making among educational leaders who may be challenged by the dual language classroom due to the logistics and financial demands such a program possesses for school district leaders. The model delivered is replicating what has been studied, but in the context of the researcher's community where dual language classrooms have never been tested. Fluency and Automaticity through Systematic Teaching and Technology (FAST) tests from spring 2023 school year were used to select students in the study. Then, select students were assessed on identical math action words determined by the researcher and teachers during a two-week duration during the months of September, October, and November during whole-group mathematic instruction. aMath FastBridge scores in November 2023 were used to determine the overall effectiveness of the dual language classroom in comparison to the monolingual classrooms. In order to complete this research, the questions that need to be asked are:

RQ1: What is the aMath FastBridge performance difference between developing English learners who were taught in a bilingual classroom versus developing English learners taught in a monolingual classroom?

$H_{0:}$ There is no difference in the aMath FastBridge performance difference between developing English learners who were taught in a bilingual classroom versus developing English learners taught in a monolingual classroom.

H_a: There is a difference in aMath FastBridge performance difference between developing English learners who were taught in a bilingual classroom versus developing English learners taught in a monolingual classroom.

In addition to the research questions stated, the researcher asked open-ended questions to the participants in third grade prior to conducting the study as well as after the study took place. The parents of the participants were also asked a set of open-ended questions before the study began to understand socio-economic background, level of English language, and the language used in the home. Most research on ELLs and English have focused on achievement and has been approached by the lens of educators and their teaching efforts. This study aims at exploring and reporting the ELLs experiences and bringing into the discussion the children's lens probably for the first time. This lens is highly important, this lens is necessary, and this lens was carefully included in the methodology of the study.

Gaps in the Literature

Current research supports the positive effects dual language classrooms have on English language learners' academic achievement. However, there is still a discrepancy regarding how proficient a student needs to be in their first language in order to be successful in the second language. In addition, there lacks research on how to best provide first language knowledge to

English language learners limited in proficiency in their first language in order to adequately learn in their second language. Not enough research has been developed to show that cross-language transfer can occur at any English language learner's ability and grade the cross-language transfer needs to be in. "Although children may have language-independent knowledge of a concept because they know the corresponding word for that concept in L1, there is often little to no information about that concept or its L1 label that children could use to acquire the word in L2" (Goodrich & Lonigan, 2017, para. 9). Through this study, the researcher worked with the classroom teacher and translator to develop formal assessments. These assessments were given at the end of each two-week dual language classroom period. The concepts learned in both the Spanish and English language were assessed to better understand how well the ELL is acquiring the L2. This research provided imperative funds of knowledge for the best practices to help educate English language learners in a monolingual school district. This study also guided motivational factors that lead the researcher to provide methods for students to "adequate motivation to learn" (Cummins, 2000, p. 38). There has also been a lack of studies to include children's voices and how they were impacted by the dual language classroom. Studies show benefits of a dual language classroom; however, how does this benefit the students' social-emotional well-being.

Conclusion

Diversity and growth of English learners will continue to grow in America's school districts. The research has shown that in order to help ELs be successful in academics, more than just simply knowing English needs to occur. It has also provided information that language acquisition for students in their first language plays a significant role in the development of second language acquisition.

Many different English learning models have been developed and studied to help English as a second language (ESL) teachers prepare English learners for the general education classroom as well as the assessments required to understand learner achievement. By focusing on academic language skills, the achievement gap can begin to close. However, research through Jim Cummins' Common Underlying Proficiency (CUP) Theory utilizes students' first language in the classroom, rather than disconnecting the culture. This theory expands on the knowledge that the English learner understands the content when provided in the first language, therefore, comprehending and providing positive output in the second language.

Within a monolingual school district, this theory, when put into place, involves the culture, ethnicity, and language of the most diverse group of students. This model would prove to be most effective in understanding whether the CUP theory makes a significant difference in learning for ELs and mathematic instruction.

CHAPTER 3. METHODS

This research study focused on using mathematical vocabulary terms and implementing a dual language classroom in a monolingual school for English language learners to develop the language of math. In a large Latinx population, the researcher wanted to contribute to reducing the opportunity gap and take a closer look at changing one monolingual mathematic classroom and making it into a dual language classroom providing a bilingual educator during whole group math instruction time. This study compared the mathematic performance of English language learners (ELLs) in two monolingual classrooms and a dual language classroom. The purpose of this study was to explore the Common Underlying Proficiency Theory developed by James Cummins and the impact of using a student's first language in the classroom to enhance their development of a second language. This knowledge will be useful for administrative leaders who are seeking to increase student English language within the diverse population of the school district while building off of English learners' first language.

This chapter will describe the researcher's plan to develop the single-subject AB quasi-experimental design. This will compare third grade developing ELL students in a dual language classroom to third grade developing ELL students in a monolingual classroom within the same district. The dual language classroom will also be compared to third grade developing ELL students in a monolingual classroom from an external district. This chapter will describe the research design, setting and participants, instruments used to collect data as well as analyze the data, the steps taken to administer this research, and finally the ethical considerations and level of risks associated to participating in this study.

Research Questions

Primary Research Question

RQ1: What is the aMath FastBridge performance difference between developing English learners who were taught in a dual language classroom versus developing English learners taught in a monolingual classroom?

H_0: There is no difference in the aMath FastBridge performance difference between developing English learners who were taught in a dual language classroom versus developing English learners taught in a monolingual classroom.

H_a: There is a difference in aMath FastBridge performance difference between developing English learners who were taught in a dual language classroom versus developing English learners taught in a monolingual classroom.

Research Design

A single-subject AB quasi-experimental design was used to investigate the effect of incorporating a dual language classroom in a third-grade monolingual mathematics classroom compared to two monolingual third-grade classrooms with no dual language incorporated. Only two schools were used for this research design. The monolingual classroom in School A that changed into a dual language classroom functioned as an internal comparison to the treatment monolingual classroom in School A. School A is where the researcher is an English language teacher. The second monolingual classroom was an external comparison located in School B. Schools A and B have similar classroom makeup of students, which will be discussed later in this chapter. A single-subject research design was used because of the small sample size available. “Single-subject research is typical for the research design of two and 10 participants” (Chiang et al., 2015, p. 200). According to Fraenkel et al. (2015) specify that in a single-subject

approach, a baseline is needed to determine what would occur if the intervention did not take place, meaning what would occur if the dual language classroom was not implemented. Using an AB design, the researcher collected baseline data (A) and with the incorporation of the dual language classroom (B) that was delivered at different times, to observe how students' English proficiency benefited from the intervention.

Additionally, pre- and post-intervention interviews were conducted to determine how the participating students appraised their experience in the dual language classroom and connected those narratives to their level of comprehension as shown on the aMath FastBridge assessment. Post-intervention intervention interviews were also conducted with the classroom teacher and Spanish translator to gain important information regarding their experience throughout this study.

Threads to the Internal Validity of Single-Subject Research

Subject characteristics may create a difference in the product of the research. For example, variables that may cause problems are student attitudes towards school, the classroom, or teacher. The way to counter the subject characteristics and history threads were getting to better understand each participant's experience (current and past) through the pre-intervention and post-intervention interviews and account for those experiences when analyzing the quantitative math performance data.

Setting

School A: School A is a monolingual school district located in rural southwest Minnesota. The overall population of the city where the study was conducted is 13,743 people (U.S. Census Bureau, 2022). Of this population, 41 percent are Latinx (U.S. Census Bureau, 2022). The school has a population of 3,797 students in grades K-12 and 1,327 of those students are identified as

English learners (Minnesota Report Card, 2022). In third grade, 161 students are labeled as English language learners (ELLevation, 2023). There are 124 students who identify as Latinx and Spanish as a home language (ELLevation, 2023). Among 10 classrooms, 35 students have a composite level of 3.0 – 3.4. The students are distributed equally throughout the 10 classrooms. There are many English Language Learners in this community due to the pork processing plant located in the city as well as farms and neighboring city plants. This pork production facility as well as the other jobs listed provide families with work and offers individuals who do not have an educational background the ability to work and provide for their family.

School B: School B is also located in a rural community with a population of 506 people and 44 percent of the population is Latinx (U.S. Census Bureau, 2020). The school district has a population of 432 students in grades P – 8, and of those students 122 identify as English learners (Minnesota Report Card, 2022). There are 12 students labeled Englisher language learners in third grade and Latinx (ELLevation, 20203). Each section of third grade has three to four ELLs. Although School B is smaller in class and school size, the number of Latinx ELLs within each classroom are similar. The families of these students also work at the pork production plant, farms, or neighboring city plants. Many students travel from the community of School A to the small community of School B. Many families from the community of School A prefer School B because of the smaller class sizes it offers. Table 1 identifies more clearly the setting where the research took place.

Participants

Between both schools, there are 161 third grade students labeled as ELL for the 2023 – 2024 school year. Within this group, 124 identify as Latinx. From the 124 Latinx, 23 English language learners have a language level between 3.0 and 3.4 (developing), list Spanish as their

home language, and do not have an individualized education plan (IEP). All of the students also receive free-reduced lunch. ELL students are required to receive English language instruction by their English language teachers every day according to the district's English language learner plan. The classroom instruction is completed in English.

Table 1

Setting

	Number of ELLs in third grade	Number of Latinx ELLs	Latinx ACCESS 3.0 – 3.4	Number of Third Grade Classrooms	Latinx ELLs per classroom
School A	161	124	35	10	3-4
School B	17	17	3	3	1

Participants

Between both schools, there are 161 third grade students labeled as ELL for the 2023 – 2024 school year. Within this group, 124 identify as Latinx. From the 124 Latinx, 23 English language learners have a language level between 3.0 and 3.4 (developing), list Spanish as their home language, and do not have an individualized education plan (IEP). All of the students also receive free-reduced lunch. ELL students are required to receive English language instruction by their English language teachers every day according to the district's English language learner plan. The classroom instruction is completed in English.

Sampling

A total of 3 students from the dual language classroom participated in this study, as well as 3 students from the monolingual classroom in School A and 1 student from the monolingual classroom in School B. The participants from School A and School B were required to have

achieved an Assessing Comprehension and Communication in English State-to-State for English Language Learners (ACCESS) score of at least 3.0 to 3.4 from Spring 2023 testing. English learners who score in the developing stage of ACCESS testing can state simple sentences, use nouns to describe mathematical word problems about multiplication, and interpret word problems about multiplication (WIDA, 2020). Students who are developing understand the English language, but still require vocabulary terms to be described in-depth to grow to the next level of English language. The students also needed to have fall aMath FastBridge scores of no greater than 204. The overall score presented students who are at high risk and some risk of learning math. The researcher was able to validate students' fluency based on test scores found in FastBridge.

Instrumentation

Looking to close the opportunity gap within the researcher's district, the author chose to implement a dual language classroom in the monolingual school district to consider out-of-the-box approaches to teaching English language learners. Due to the high Latinx population and Spanish speaking students, the researcher chose to create a dual language classroom focusing on Spanish.

Instrumentation for this study included the Assessing Comprehension and Communication in English State-to-State for English Language Learners (ACCESS) test, aMath FastBridge assessment, Voice Memo, and a set of open-ended questions for both the participants as well as teacher and translator.

Assessing Comprehension and Communication in English State-to-State for English Language Leaners (ACCESS)

ACCESS is a proficiency assessment testing students' English skill in listening, speaking, reading, and writing (WIDA, 2023). The assessment was developed in 2003 when "an Enhance Assessment Grant was awarded to the Wisconsin Department of Public Education, WIDA's first home" (WIDA, 2023, para. 7). The original name of WIDA stood for Wisconsin, Delaware, and Arkansas because these states signified the grant. Now, WIDA is the representation for all 41 states and organizations who use ACCESS. WIDA's vision is "to be the most trusted and valued resource in supporting the education of multilingual learners" (WIDA, 2023, para. 6). The ACCESS test can be taken by paper or online. Each section of the ACCESS test may take different lengths of time. Reading is estimated to be about 60 minutes, listening is up to 65 minutes, speaking is approximately 50 minutes, and writing is up to 90 minutes (WIDA, 2023). Students who are on an individualized education plan (IEP) may take the alternate-ACCESS test as requested by their case manager. ACCESS is taken every Spring for students identified as English language learners in grades Kindergarten through twelfth grade. Students who were selected for the research are in the developing stage of English language development. Developing was already described in Sampling on page 68. Appendix G provides information about what English language learners can do at each level in the third grade taken from the World-class Instructional Design and Assessment (WIDA) The English Language Learner Can Do Booklet (2012).

aMath FastBridge

FastBridge is a researched-based assessment tool developed at the University of Minnesota that assesses students' math abilities and helps teachers make informational decisions

when teaching (Illuminate Education, 2021). Students are required to complete 30 questions on their student iPads provided by the district. The test is not taken in paper and -pencil format. As the student answers questions, the level of difficulty is based on how well students answered the questions previously. This is an adaptive test. As stated by Illuminate Education (2021) "most coefficients are above 0.70 and several in the 0.80s – thus demonstrating strong validity evidence" (p. 21). aMath is used to make predictions about student performance on state assessments.

> aMath is used to screen all students and estimate annual growth with tri-annual assessments (fall, winter, spring). Benchmark standards (i.e., "cut scores" or "targets") are built into the system to assist in determining which students are at-risk for academic failure versus those who are on track to be successful (Illuminate Education, 2023, para. 5).

In third grade, students who receive a score of 191 or lower are considered high risk. Students who score 192 – 197 are at some risk of academic learning while students who score 198 – 203 are low risk, and students who score 204 or higher in the Fall are on college pathway of learning (Illuminate Education, 2023). The students take the test at the beginning of the school year to create baseline data for the assessments as they progress through third grade.

Pre-Test Interviews

Data collection included a pre-test interview that occurred before the first dual language classroom. The students were interviewed individually so that the researcher gained insightful information about how the student felt about the dual language classroom and the thoughts of their peers would not affect their opinion. In a study conducted by Heary and Hennessy (2012) found,

> The participating children showed no significant difference in their preference for one method over the other. Thus, whether to choose individual interviews or focus groups is likely to depend on the nature of the research question in any given study (p. 2).

The data that was collected in the pre-test interview included: 1). What do they like about school? 2). What would they change about school if they could change anything? 3). What language do they speak the most and why do they speak that language? 4). What language do they wish they could speak the most in the classroom and why do they feel that way? 5). Do they feel confident in school and how do they feel about how well they do on homework and why do they feel that way?

Questions one and five provided the researcher insight into the feelings of the participant. Feelings could include being fearful or worried about something happening at home or in the classroom. If the student is fearful or lacks confidence in the classroom, these variables could possibly threaten the internal validity of the research. Question two provided the researcher with an understanding of how often the child must speak in their native language and reasons for this. Possible reasons may be the child is the only person in the family who can speak their native language and English, so the participant is relied on to help the parents communicate outside of school.

Voice Memo

Voice Memo is an application found on apple phones and iPads. “Audio memos is an easy-to-use audio recorder full of powerful features” (Norcross, 2017, para. 4). Voice Memo is an easy way to capture voices and place them into folders on the iPad or computer to keep files separate. Voice Memo can also be transcribed in Microsoft Word with the time stamp available. By the transcription of the recordings, a Microsoft Excel table was utilized to tally the words

spoken in English and/or Spanish as well as the math vocabulary that was used. The table was only for frequency counts. Table four displays how the researcher counted the frequency of the language used in the general education whole math group classroom time.

Table 2

Frequency of Language Used

STUDENT	ENGLISH	SPANISH	MATH VOCABULARY USED
STUDENT A			
STUDENT B			
STUDENT C			

Voice Memo was used because the use of a microphone for each individual student is only found in the district's Q-Ball, a microphone that can be heard throughout the entire classroom and used to help soft speakers be heard. The researcher provided the devices to the participants each day so that the iPads were secured every night as well as charged in the researcher's locked classroom. Should the researcher be absent from school, the participating teacher had keys available to distribute the iPads and lock them in the classroom after the school day.

Post-Test Interviews

The post-test interview followed the aMath test and after the students have experienced the dual language classroom The post-test interview includes: 1). What did you think when your math classroom had someone speak a language you know? 2). How did it make you feel? 3). How did this change the way you worked in the classroom? 4). Do you think you understood the content better or worse? 5). Is this something you wish you had all of the time? Why or why not?

6). What do you want to tell your teacher about having both Spanish and English in the classroom? 7). Was it easy to understand Spanish, or were there words you did not understand? The post-test interview allowed the researcher to check for possible threats to the study. Many of the post-test interview questions are about feelings. This is an indicator of how much effort or time could be put into classroom work. The pre- and post-test interviews can be found in Appendix C. The aMath FastBridge test was taken at the end of November.

The classroom teacher and Spanish interpreter were also asked a series of six questions reflecting on the dual language classroom. The post-dual language classroom interviews included: 1). What knowledge or experience have you had in a dual language classroom? 2). How did you know or determine who was going to speak when going back and forth in the lesson and conversations? 3). What was your overall experience of implementing the dual language classroom? 4). How do you think the students responded to the dual language classroom comparing the first day to the last day? 5). Do you think having a dual language classroom would be beneficial for schools with a large EL population? 6). What are three things you would change if you had to complete this research over again? Asking this set of questions allows the researcher to change or make recommendations for future research. It also provided the teacher and translator with a voice to be heard so that the researcher could understand what they felt during the time.

Data Collection

ACCESS Scores

ACCESS scores for the incoming third grade students from School A were viewed on Day One by the researcher who has direct access to read the data. The third grade English language students for the 2023-2024 school year took the ACCESS test in the Spring 2023 with

their second grade English language teachers. Students who were going to be in the dual language classroom as well as monolingual classroom from School A with an English language score of 3.0 – 3.4 were selected. Also on Day One, the researcher contacted School B to ask the English language coordinator for the score reports of any student with an ACCESS score between 3.0 and 3.4 from Spring 2023.

aMath FastBridge

The participants in the dual language classroom and monolingual classroom from School A took the aMath FastBridge test in the Spring 2023 with their second-grade classroom teachers. On Day Two, the researcher requested the participant's Spring 2023 aMath FastBridge from the classroom teacher to make sure the participant's scores did not exceed 204. The students also retake the aMath FastBridge assessment at the beginning of the school year. On Day Six, the researcher confirmed the participants' aMath FastBridge assessment scores to ensure their participation in the study. Also on Day Six, the researcher sought out the aMath FastBridge scores for the participants from School B from the English language coordinator and ensured the score did not exceed 204.

Pre-Test Interview

Student A, Student B, and Student C in the dual language classroom were asked a series of pre-test interview questions separately during whole group math time during Day Six of the research. While each participant was interviewed, the other participants were in the general education classroom. The participants were pulled from the classroom into the researcher's classroom so that students felt comfortable and safe. The set of questions took about 15 minutes per student. The questions were developed by the researcher to gain a better understanding of the participants' attitude and motivation towards school. A third-grade paraprofessional was

available to help translate the interview questions and the students' responses should the student like the questions translated. The interviews were recorded on Voice Memo so the researcher was able to go back and listen to the recordings and transcribe the students' answers.

Interventions

Baseline data collection of how much English and Spanish was used in the mathematics classroom were completed on Day Seven. The researcher requested the use of three iPads from the district. All the devices contained the application, Voice Memo. Explicit instruction and practice on how to use the iPads were given to the three participants away from peers during the morning of the first observation on Day Seven in the researcher's classroom. Each participant was instructed to place the iPad in their lap with the microphone towards them during whole group math time. The participants were also instructed to take the iPad with them if they transitioned to their desks to work with partners or groups. The researcher collected the recordings and made tally marks in Microsoft Excel of how much English and Spanish was used, and the words spoken during whole group math time. The iPad allowed the students with the ability to move around the classroom and record conversations.

The translator pushed into the mathematic classroom providing dual language support during days nine through 16. A curriculum map was given to the translator to provide guidance of the learning target for the days the translator was in the classroom. During days nine – 16, the translator provided dual language support. The translator translated all math content from the teacher to the students by speaking. The three participants had their iPads during each intervention, instructed to do the same thing done on Day Eight. The researcher observed the classroom taking notes of what was occurring.

Post- Assessment

The aMath FastBridge test was taken on Day 16 in the participants' classroom during whole group math time. aMath FastBridge is required to be assessed by the district in the late Fall. The test scores from the participants in the dual language classroom and monolingual classroom from School A were used. The researcher had full access to the test scores. The researcher requested from the English language coordinator from School B the test score from the participant in School B.

Post-Test Interview

When testing was complete, the researcher organized a post-test interview to allow the participants to reflect on their time in the dual language classroom. The researcher had the translator in the interview to restate what was asked and allowed students the ability to answer in their first language. The researcher replicated how the pre-test interviews were conducted. Each student was asked the questions separately while the other participants were in the general education classroom during their whole group math time. Voice Memo was used to record and transcribe the answers of the participants.

Post-test interviews for the teacher and translator were implemented the same way. The teacher and translator were asked a series of six questions reflecting on their time in the dual language classroom. They discussed how they worked with each other to provide instruction for the students.

Data Analysis

Frequency distribution was used to compare the overall aMath FastBridge assessment from the students in the dual language classroom as compared to the students who were in the monolingual classrooms from School A and School B. Fraenkel et al. (2015) state "derived

scores are obtained by taking raw scores and converting them into more useful scores on some type of standardized tests" (p. 189). An abundance of data visualization was used to show how the students did on the aMath FastBridge test as well as the how their overall use of Spanish or English may have affected the scores. The use of visualizations provided the researcher with a better understanding of the overall scores of the students.

Table of Overall Research Alignment

Table 3 describes the alignment between the research question and the methods used in this study to ensure that all variables have been reported accurately. Table 4 summarizes the data analysis.

Table 3

Research Question Alignment

Research Question (RQ)	Variables	Design	Instrument	Validity & Reliability	Technique	Source
RQ1						
What is the FastBridge math performance difference between developing English learners who were taught in a bilingual classroom versus developing English learners taught in a monolingual classroom?	Language proficiency	Single-subject experimental with an ABC design	ACCESS Test	.947	Assessment	Student
	Math performance		aMath FastBridge Test	.95	Assessment	Student

	Pre-Test and Post-Test Interview	Interview	N/A	Interview before test and after test	Researcher and student
	Post-Test Interview	Interview	N/A	After test	Researcher and teacher
					Researcher and interpreter
	Classroom observations	Microsoft Excel		During whole group math	Student

Table 4

Data Analysis

Research Question	Data Analyses
RQ 1 What is the aMath FastBridge performance difference between developing English learners who were taught in a dual language classroom versus developing English learners taught in a monolingual classroom?	Frequency Counts and Percentages, Data Visualization for Single-Subject Research

Procedures and Timeline

Data collection for this study began in the Summer, 2023. The timeline for this study is shown below and is provided in a more detailed description in the next section.

- Day 1: Selected students from School A and School B who achieved a 3.0 on Spring ACCESS test
- Day 2: Selected students from School A in the monolingual classroom and dual language classroom who scored no greater than 204 on Fall FastBridge Test
- Day 3: Selected students from School B who scored no greater than a 204 on Fall aMath FastBridge
- Day 4: Sent home initial letters of consent to students and families from School A and School B who qualify for the study.
- Day 5: Back to school conferences to address the implementation of the study in School A
- Day 6: Confirmed aMath FastBridge scores from participants in the study from School A and School B

- Day 7: Pre-test Interview with the participants in the dual language classroom
- Day 8: Collected baseline data of how much English and Spanish language is used in the math classroom by participants in whole group math time using Voice Memo
- Days 9 – 16: Implemented dual language math classroom
    - Days 9 - 16: Observe classroom and give students iPads
- Day 17: aMath FastBridge
- Day 18: Post-Test Interviews

In Spring 2023, the researcher gained approval for the research to occur internally at School A and externally at School B. The researcher analyzed the class list from the dual language classroom and the monolingual classroom in School A and selected English language learners who scored a 3.0 on the Spring 2023 ACCESS test. The researcher was an English language teacher in School A and has access to the test scores. Once students were selected, the researcher reviewed the selected student's aMath FastBridge scores from Spring 2023 to find a common score no greater than 204. After students were chosen, a letter in both English and Spanish notified parents of the research project and that their child was a potential participant in the study. Parents from the dual language classroom in School A were also mailed out an informed letter describing the study and the addition of the dual language classroom.

During back-to-school conferences, the researcher sat down with the school's interpreter, the guardians and participants in the research, and the teacher to discuss the research project. This allowed the families to ask any questions regarding the study and gained an adequate understanding of the researcher's goal. The researcher obtained a signature from the participant's guardians on the informed consent letter. The other families with students in the dual language

classroom were able to voice concerns, address questions, or comment on the study. This was a wish of School A so that parents were communicated with to ensure that the guardians understood the school had the students' best academic interests in mind.

Although the participants took the aMath FastBridge assessment in the Spring 2023 with their second-grade classroom teachers, the school required students also took the aMath FastBridge assessment at the beginning of the school year to see if baseline data was different from the end of the previous school year. The researcher confirmed the participants' assessment scores to ensure each student would be able to participate in the research study. It was planned that no student has an aMath FastBridge assessment score greater than 204.

Individual pre-test interviews were conducted in the second week of school during the whole group math class time, Day Seven of the study. Waiting after the first week of school allowed the participants time in their classroom to get to know their peers and classroom teacher. The pre-test interview was used to determine the English language learners' overall feelings about school and their own schoolwork.

The dual language classroom was implemented in September and the beginning of October. It was important for the interpreter to interpret the math vocabulary words when spoken in a sentence, used to describe a word problem, when introduced for the first time, or to restate when students were not understanding. For the purpose of the study and to incorporate an AB design, the intervention incorporated the dual language classroom. The participants were recorded using Voice Memo from the iPad provided by the school to the researcher solely for the purpose of the study to distinguish who was speaking during the whole group math time. Each student held an iPad to discreetly capture their voice when in whole group. The students were

instructed on how to use the iPads prior to the observation. The students continued to be labeled as Student A, Student B, and Student C.

In November 2023, School A and School B took the aMath FastBridge assessment. The assessment was completed in only English as this is the only way aMath FastBridge assessments were conducted. When the researcher explored reasons as to why this was not an option for ELLs, she found, "At this time FastBridge does not offer Spanish versions of its math assessments" (FastBridge, 2022. par. 4). The researcher received participants' scores from both the dual language class and the monolingual class in School A. The researcher contacted the English language coordinator from School B and received the scores from the ELL teacher with the student participating in the research. The scores were compared to interpret the results from the dual language classroom and the monolingual classrooms.

At the end of the aMath FastBridge assessment, the participants from the dual language classroom were given the post-test interview individually during whole group math instruction time. The researcher set aside 15 minutes per student to talk about ways the classroom motivated the learners, if they felt more confident in the classroom, if it changed their view of school, or how they felt overall with having their first language utilized in the dual language mathematics classroom. The researcher also conducted interviews individually with the teacher and translator.

Ethical Considerations

Participants were third grade English language learners with ACCESS scores between 3.0 and 3.4. The researcher was granted the ability to conduct research in School A and School B by written approval from administration in March 2023 and April 2023 (see Appendix A). The researcher was also given approval from Minnesota State University's (MSUM) Institutional Review Board (IRB) found in Appendix B.

Participant guardians were mailed an informed letter of consent. Each consent form was translated into Spanish describing the reason for the research and the selection of the student. Informed letters were also be sent to all family members with children learning in the dual language classroom to notify them of the research being conducted in the Fall 2023.

During back-to-school conferences in August 2023, participant guardians were allowed to ask questions, concerns were taken into consideration and addressed, and guardians were given full awareness of what the quarter would sound and look like. The researcher obtained the signatures of the guardians of the participants as well as the translator during conferences. This informed consent can be found in APPENDIX D. Throughout this process, the researcher valued the academic performance of all the participants. The anonymity of the participants were maintained by giving each of the students a letter (e.g., Student A, Student B, and Student C). The interview and assessment were tracked under their student letter given to them.

The data collected was kept on a secure laptop and information will be destroyed after 3 years. Anonymity was maintained throughout the entire research process. This study did not impact the students' ability to learn English and content knowledge in the classroom.

Conclusion

The purpose of this single-subject AB quasi-experimental design was to explore the comparison of a third-grade dual language mathematics classroom with a monolingual classroom focusing on math action words and how it relates to English language learners' academic performance. Jim Cummins' Common Underlying Proficiency (CUP) theory was applied as a guide to this research. It was important to study the effects of language learning when adding bilingual into the classroom.

In Chapter 4, the researcher will provide in detail the results of the quantitative analyses as it was presented in the methodology. The study of a bilingual mathematics classroom compared to a monolingual classroom will be evaluated.

CHAPTER 4. FINDINGS

The researcher used a single-subject AB quasi-experimental study to investigate the effects a third-grade dual language classroom had on English learners' understanding of math action words in the whole group mathematic instruction time as compared to two monolingual classrooms. aMath FastBridge assessment scores were used to compare the students' understanding of math action words in word problems and in math problems in the late Fall. In addition, the researcher used frequency counts to record the amount of English, academic English, and Spanish words uttered during whole group math instruction. Pre-and post-test interviews accompanied the research to understand how the students were affected emotionally by the addition of the dual language classroom.

In Spring 2023, the researcher gained approval for the research to occur internally at School A and externally at School B. The researcher had already chosen which classroom would be the dual language classroom and the monolingual classroom for School A. On Day 2, students were selected with the qualification criteria of having an ACCESS score between 3.0 and 3.4, as well as an aMath FastBridge assessment score no greater than 204. The researcher contacted the English language teacher from School B on Day 3 with the qualifications to obtain participants for the research. Students had to have an ACCESS score between 3.0 and 3.4, and a Spring aMath FastBridge score no higher than 204. Once students were selected, the researcher sent letters in both Spanish and English home. School B received the approval from the parents. During back-to-school conferences, the researcher at School A discussed the research with parents and obtained their approval. The aMath test is also taken in the first two weeks of the new school year. The researcher confirmed assessments' scores to ensure the students could participate and a pre-intervention interview was also conducted with the students. It was

important to the researcher to see how Student A, B, and C felt in the monolingual classroom. Giving students a voice was essential because this was the first time each student was a part of a classroom with an English-speaking teacher and a Spanish interpreter.

Information presented in this chapter includes a summary of the study's purpose, the research question, and supporting data.

Purpose of the Study

The goal of this research project was to test the effect of turning a third-grade monolingual classroom into a dual language classroom in a monolingual school district and what this instructional intervention had on 3 English language learners' aMath FastBridge assessment scores from Fall in September to Late Fall in December. The 3 ELLs were identified as developing according to the WIDA state standards (p. 92) and described on page 23. The focus on math action vocabulary words determined what would be translated orally in the classroom when the Spanish interpreter was present during the math action words. The action words are words used to help students understand whether they should add, subtract, multiply, or divide in a word problem. The researcher hoped that with understanding the action words in both the native language (L1) and second language (L2), student aMath FastBridge assessment scores would increase from Fall to Late Fall.

By the Late Fall assessment, the researcher wanted to determine if having the mathematic vocabulary terms as well as the instruction translated in the classroom helped increase students' performance on the aMath FastBridge test. The aMath FastBridge test scores were compared to peers within the same school district, School A, and a neighboring district with similar classroom diversity, School B. Neither school offers dual language classroom supports. Given the abundance of research conducted on dual language classrooms, the researcher sought to confirm

if a dual language classroom would work for the population of students in her own school. Providing teachers with more knowledge on how to foster their students' learning would make an impactful classroom of learners.

The dual language classroom instruction took place in September and the beginning of October. A pre-intervention observation was conducted on Day 8 during whole group mathematic instruction. During the observation, the students' English language, academic English, and Spanish language were recorded. Then, during Day 9 through Day 16, the intervention phase took place. Day 9 through Day 16 took four weeks. The students in the dual language classroom were informed about the change that was going to be made during mathematic whole group time. The researcher and teacher discussed what a dual language classroom was and how it might sound or look like. Students could ask questions at any time. The dual language classroom was implemented two days per week. The students were reminded about the intervention phase on the first day with the interpreter, classroom teacher, and researcher present. The Spanish interpreter translated mathematic content for approximately twenty minutes during the thirty-minute whole group class time two-days each week, focusing on mathematic vocabulary. The researcher, classroom teacher, and interpreter were in communication through a group email about the lesson content before being in the classroom the week before. The email contained the mathematic vocabulary words that were going to be used in the classroom for the week as well as the lesson topic. The interpreter was able to ask questions if needed or clarification on mathematic lessons and this allowed the interpreter to prepare for the vocabulary words used during each session. On page 81, it is mentioned that the interpreter had a crucial role in interpreting the mathematical vocabulary words. This involved interpreting the words when used in a sentence, explaining them when presented in a word

problem for the first time, or rephrasing them when students were having difficulty understanding the content. During the thirty-minute intervention whole group lesson, Student A, Student B, and Student C were recorded each day. These students were provided with an iPad issued by the school district for research purposes. On Day 17, they took the aMath Late Fall FastBridge assessment. On Day 18, a post-intervention interview was conducted with each student separately to listen and reflect on how they felt after the implementation of a dual language classroom. On Day 19, the interpreter and teacher were interviewed separately to gather information about their experience in the dual language classroom. Table 5 presents the pre-intervention treatment and post-intervention treatment.

Table 5

Description of Pre-Intervention, Intervention, and Post-Intervention Treatment

Day 1 Selection of Students using ACCESS	On Day 1, the researcher selected students from School A who had ACCESS scores between 3.0 and 3.4 in third grade. The researcher also emailed the EL coordinator from School B for students who also met this criterion. Table 6 describes the participants chosen for the study.
Day 2 Selection of Students School A using FastBridge	On Day 2, the researcher selected students from the monolingual and dual language classroom in School A who had no greater than a 204 on aMath FastBridge. Because the researcher is an EL teacher in School A, she could look up student assessment scores.

Day 3 Selection of Students School B using FastBridge	The researcher selected potential participants from School B. The researcher contacted the English language coordinator from School B for students who met the criteria of having no greater than a 204 in FastBridge and a 3.0 - 3.4 in ACCESS in third grade.
Day 4 Send Home Initial Letters	The researcher sent home initial letters of participation to parents of students who qualified for the study. The researcher used letterheads from both School A and School B to send to parents. This took approximately 1 hour.
Day 5 Back to School Conferences School A	The researcher met with potential participant's parents during back-to-school conferences and parents whose students were in the dual language classroom. The researcher, interpreter, and classroom teachers met with Students A, B, C, D, E, and F. The interpreter was the Spanish interpreter at the back-to-school conferences, so she attended the meetings, and parents were able to confirm any questions or concerns with her. Each meeting took approximately thirty minutes.
Day 6 Confirm aMath FastBridge Scores	The researcher confirmed aMath FastBridge scores for Fall. The researcher had to also confirm with School B Student G aMath score. Data collection took approximately thirty minutes.
Day 7 Pre-Intervention Interview	Pre-Intervention Interview with Student A, Student B, and Student C. The students were interviewed separately during whole-group math classroom time in the researcher's classroom

	using Voice Memo. Each student had a school issued iPad for the research kept safely in the researcher's classroom. Each interview took approximately 5 minutes.
Day 8 Pre-Intervention	The whole group math was taught in a monolingual classroom. Student A, Student B, and Student C were recorded using Voice Memo on iPads to demonstrate language level for thirty-minutes. Student A, Student B, and Student C English, academic English, and Spanish words used or uttered during whole group math was tallied and placed into a Google Excel document. Day 8 was approximately 35 minutes.
Week 1 Days 9 and 10	The interpreter arrived for the first time on Day 9. The teacher and interpreter were getting used to teaching together. The classroom teacher was finding out when to stop talking to allow words to be interpreted. Student A, Student B, and Student C each had their iPads to record their language being used. A tally was made for each English word spoken or uttered, academic English, and Spanish word. Day 9 was thirty-five minutes. On Day 10, the interpreter and classroom teacher were more aware about when to let the other talk to the class. Student A, Student B, and Student C each had their recording device, and again, frequency counts were used to collect data on English

	words, academic English, and Spanish words uttered or spoken. Day 10 took approximately thirty minutes.
Week 2 Days 11 and 12	The second week of intervention was Homecoming week. On Day 11 students worked on division and academic works *divided by, equals,* and *divide by.* This whole group lesson was approximately thirty minutes. Day 12 was a shortened math class period due to Homecoming festivities. Students had the opportunity to purchase homecoming accessories from the high school student body. Classroom instruction was twenty-five minutes.
Week 3 Days 13 and 14	During Day 13 and Day 14 of the dual language classroom, Student A, Student B, Student C, and the class worked on multiplication. The focus of Day 13 was understanding *times* and *patterns* in multiplication. This lesson took approximately thirty minutes. The Identity Property and Zero Property was introduced on Day 14. The whole group went through many examples with both the classroom teacher and interpreter together. The whole group lesson took approximately thirty minutes.
Week 4 Days 15 and 16	During Day 15, the Identity Property was reviewed as a whole group with the interpreter and classroom teacher. Students were

	given individual work time on multiplication for fifteen of the thirty- minute whole group math class before reviewing the worksheet together. Student A, Student B, and Student C continued to keep their audio recording as each one sat at their desk. The researcher was able to pick up whispers and utterances. The researcher was also able to hear how students worked by themselves. This information was picked up by the iPads Student A, Student B, and Student C were using. Day 15 took approximately 35 minutes. Day 16 was the final day the interpreter would be in the classroom. Students were sad and asked if the interpreter would return this school year. All multiplication content math action words were reviewed. Day 16 took 30 minutes.
Day 17 Post-Intervention	Student A, Student B, and Student C took the aMath FastBridge Assessment during whole group math classroom time with classroom peers. Dividers were placed on desks. Students could use headphones and their iPads for the assessment. The aMath FastBridge Assessment took more than the whole group mathematic period and went into small group work time. The assessment took approximately forty-five minutes.

Day 18 Post-Intervention Interview	Student A, Student B, and Student C were asked a series of six post-intervention questions in the same way as the pre-intervention interview. Each student was asked the questions individually in the researcher's classroom so that Student A, Student B, and Student C would vocalize their opinion of a dual language freely.
Day 19 Post-Intervention Interview	On Day 19, the researcher asked the classroom teacher and interpreter a series of 6 questions about the dual language classroom. The questions were asked to identify what went well, what could be improved, and recommendations for future dual language classrooms. The interviews were fifteen minutes each.

Research Question and Hypothesis

Primary Research Question

RQ1: What is the aMath FastBridge performance difference between developing English learners who were taught in a dual language classroom versus developing English learners taught in a monolingual classroom?

H_0: There is no difference in the aMath FastBridge performance difference between developing English learners who were taught in a dual language classroom versus developing English learners taught in a monolingual classroom.

H_a: There is a difference in aMath FastBridge performance difference between developing English learners who were taught in a dual language classroom versus developing English learners taught in a monolingual classroom.

Participants

A total of three students from the dual language classroom participated in this study, three students from the monolingual classroom in School A and one student from the monolingual classroom in School B. The participants from School A and participants from School B were required to have achieved an ACCESS score of at least 3.0 from the Spring 2023 testing. Having a score of 3.0 indicates the English learner is at the *developing* stage in English language. Students who are *developing* understand the English language, but still require vocabulary terms to be described in-depth to grow to the next level of English language. *Developing* English learners, according to the district EL handbook policy, are students that require 30-minutes, five times per week of English language development (ELD) instruction (Department of Learning and Teaching, 2023). An example of a developing student is one who has some general and specific language in the content areas, can expand sentences further than just one or two with speaking practice or written paragraphs to visualize the information, and has some written or speaking errors that do increase miscommunication when the student has to hear and accomplish more than two-step commands, directions, or questions (Young, 2023). The students needed to have Fall aMath FastBridge scores no greater than 204. The overall score helps identify students who are *at high risk* and *some risk* of learning math. The researcher validated students' fluency level based on test scores obtained on the FastBridge. Table 5 provides data regarding the specific students chosen for this study. The data includes the student's gender, ethnicity, Spring 2023 ACCESS score, and Fall aMath FastBridge assessment score pre-intervention. Of the seven participants, five were girls and two were boys. All participants listed Spanish as their ethnicity/race. One student had an ACCESS score of 3.0 and two students had a score of 3.1. There were 2 students with an ACCESS score of 3.2 and 2 with

an ACCESS score of 3.4 in third grade. Data Table 6 helps confirm that monolingual classroom students and dual language classroom students had similar English language development. Table 5 also shows that 6 students received an aMath FastBridge score between 190 and 200, and 1 student received a score higher than 200, but lower than 204.

Table 6

Personal Demographics

Participants School A Dual Language Classroom	Gender	Ethnicity	Entered District	Entered English Language	Spring ACCESS Score	Spring aMath FastBridge Score	Household Members	Household Members Speaking English
Student A	Girl	Spanish	Kindergarten	2020	3.2	191	Dad, Mom, Kindergarten Sister	Self
Student B	Girl	Spanish	Kindergarten	2020	3.4	203	Dad, Mom, Preschool Sister and 2-Year-old brother	Self
Student C	Girl	Spanish	Kindergarten	2020	3.1	196	Mom, 2nd Grade brother, 1 Year-old brother	Self and 2nd Grade Brother
Participants School A Monolingual Classroom								
Student D	Boy	Spanish	First Grade	2021	3.1	191	Mother, Father, Kindergarten Sister, Baby Brother	Self and a little Kindergarten Sister

Student E	Girl	Spanish	Kindergarten	2020	3.4	197	Mother, Father, 12th Grade Brother	Self, Father, Brother, and a little Mother
Student F	Girl	Spanish	Kindergarten	2019	3.0	193	Mother, 2 Year-Old Brother	Self
Participant School B Monolingual Classroom								
Student G	Boy	Spanish	Kindergarten	2019	3.1	193	Mom, Dad, Self	Self

Note. All the students were in the third grade. Students with a score from 3.0 to 3.4 are considered *developing* English language learners. ACCESS is a proficiency assessment testing students' English skill in listening, speaking, reading, and writing (WIDA, 2023). FastBridge is an adaptive researched-based assessment tool developed at the University of Minnesota that assesses students' math abilities and helps teachers make informational decisions when teaching (Illuminate Education, 2021).

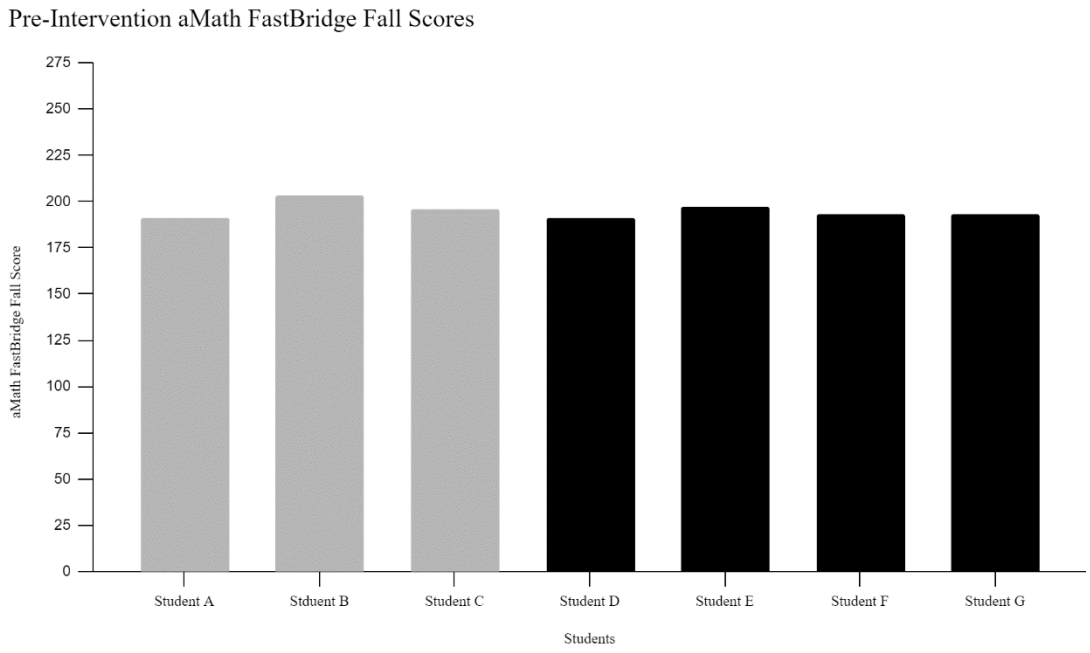
Pre-Intervention aMath FastBridge Scores

Figure 2 provides data regarding the aMath FastBridge Fall pre-intervention scores for Student A, Student B, Student C, Student D, Student E, Student F, and Student G. Figure 2 shows that of the three participants in the dual language classroom, Student A and Student C scored less than 200 on the aMath FastBridge Fall assessment and only Student B scored more than 200. Student A received a score of 191, Student B scored a 196, Student C received a score of 203. Of the students in the monolingual classroom, no one scored more than 200 on the aMath

FastBridge fall test. Student D scored 191 on the assessment. Students F and G scored 193. Finally, Student E scored 197.

Figure 2

AMath FastBridge Falls Scores for All Participants



Note. The scores, as discussed on page sixty-eight, represent students who are at *high risk* and *some risk* of learning math.

Although the researcher focused on one essential research question, the researcher wanted to understand if language development played an important role in the knowledge and understanding of mathematical vocabulary terms within the dual language classroom. A consecutive Spanish interpreter went into the classroom for whole group mathematic time providing instruction and vocabulary terms in Spanish. The researcher audio recorded the students during the whole group's mathematic time and used tally marks to count the frequency of English words spoken or uttered, academic content words spoken, and Spanish used in the

classroom. The researcher requested individual microphones and contacted the district technology department to inquire if they had such equipment available for research purposes. However, the microphones were only designed to amplify the voices of students during a group discussion in class and were not intended for recording. Therefore, Student A, B, and C were instructed before class on how to use the iPad with the audio recording. The researcher showed Student A, B, and C how to turn on the audio recording and stop it after whole group instruction. The iPads allowed the researcher to discreetly capture their voice when in the whole group. Each student was able to place the iPad in their lap with the microphone faced towards their voice without having to show they were being recorded. Figure 3 shows an example of Student C holding the iPad during on one of the first whole group math times. The following figures show what was found during this period regarding language performance in English, academic English, and Spanish.

Figure 3

Example of Floor Arrangement During Whole Group Math

Pre-Intervention Language Performance

Figure 4 show the frequency of English words spoken or uttered during the pre-intervention as well as the Academic English words spoken, and Spanish words used in the classroom during whole group mathematic time. Student A used twenty-three English words. Most of these words were repeating the numbers being counted with the teacher and utterances such as *"Yeah"* or *"Um."* Student A used one academic word to describe the size of an object (smaller). Student A did not use any Spanish words. Student B used thirty-four English words. Many words used were also numbers repeated to count with the teacher, but also when trying to describe thoughts or opinions. These words were, *"So, you, and would, yeah, little."* The student also used two academic words which were *minus* and *subtract*. The student did not also use any Spanish words. Finally, Student C only spoke fifteen English words during the pre-intervention. The student also did not use any academic words and spoke more Spanish than Student A and Student B with twenty-two words. The Spanish terms were more social interaction with peers describing their outfits and looks during. When Student C wanted things to be repeated, the student would say under their breath "*Otra vez,"* instead of asking the teacher directly to repeat.

Pre-Intervention Interviews

Pre-Test Interviews. Before the intervention took place, the researcher asked the participants six questions. The participants were asked if they would like someone to interpret the questions; they stated they were fine speaking English to the researcher. The researcher asked the questions individually during whole group math time in the researcher's classroom. As indicated in Chapter 1, the researcher is an English language teacher in School A. The researcher did not want a focus group because the researcher needed to understand each student. The researcher wished to understand the student's background knowledge of school and their feelings

about it. Having interviews conducted individually also allowed students to open up more about their likes, dislikes, and reasons for the answers. The researcher needed to understand if any feelings would hinder the research. The first question had the students reflect on what they liked about school. Each student had a different response. Student A stated reading was their favorite thing about school, Student B said doing math, and Student C said being with friends.

In the second question, the students had to state what they would change about school. Student A was more hesitant to answer this question, so the researcher restated the question in a different way. The researcher asked then what the student would do to make a difference in school. The student said *recess.* Student B stated they would change gym because *"Music first and then gym."*

Repeating the statement, the researcher found that Student B likes music, which is why the student would change it. Student C did not have anything they would like to change about school. Due to the student's slight hesitation, the researcher reiterated the confidentiality of the interviews and information that would be presented to the advisor and written on paper.

The third and fourth question related to the language spoken in school. The students were asked what language they speak the most in the school and what language do they wish was spoken the most in the classroom. Student A stated she speaks both English and Spanish in the classroom and in school. When asked about why the student chooses to do this, the student said, "Sometimes my friends talk Spanish, so I talk Spanish, when *they talk English, I talk English."*

Student A also stated she wished she could speak English the most in the classroom because then she would know what the teacher is talking about in English. Student B also stated she speaks both English and Spanish in school. When asked why the student replied, "So, when to, um, *the teacher doesn't speak Spanish, so I know how to speak in Spanish."*

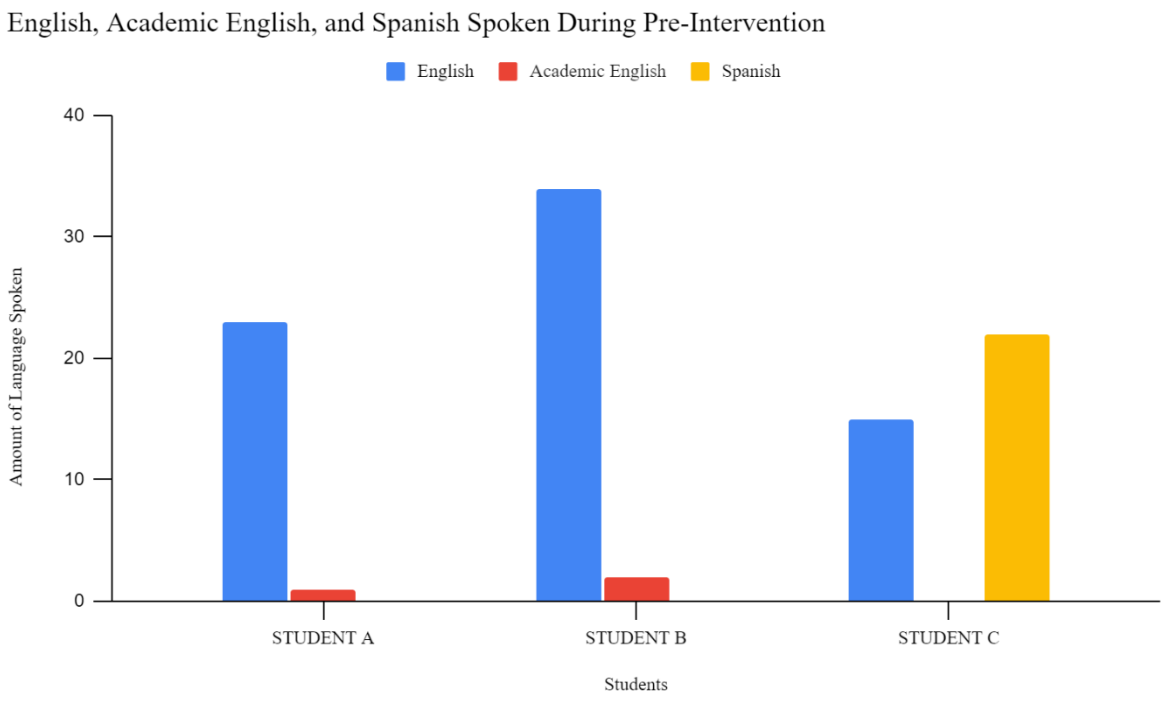
The researcher restated what the student said and then confirmed the student speaks Spanish because she listens to what the teacher says in English to help friends in Spanish. When the student was asked what language she preferred in the classroom, she stated English so she can learn more words. Finally, Student C was asked what language she spoke the most and she stated Spanish because, “If I talk in English, *then my mom cannot understand.”*

Student C also said she wished she could speak English the most in the classroom because she already talks a lot of Spanish.

In the final question, all participants were asked about their confidence level in school and how they think they do. All students thought they did well in school.

Figure 4

English, Academic English, and Spanish Spoken During Pre-Intervention



Post-Intervention aMath FastBridge

aMath assessment scores from the dual language classroom post-intervention compared to the performance in the monolingual classrooms are displayed in Table 7. The data show that the students in the monolingual classroom demonstrated higher levels of understanding of math concepts compared to the students in the post-intervention dual language classroom.

Table 7

Post-Intervention aMath FastBridge Assessment Scores Late Fall

Student	aMath Late Fall Assessment Score	Type of Classroom	School
Student A	193 (+2)	Dual language	A
Student B	205 (+2)	Dual language	A
Student C	193 (-3)	Dual language	A
Student D	197 (+6)	Monolingual	A
Student E	206 (+9)	Monolingual	A
Student F	192 (-1)	Monolingual	A
Student G	195 (+2)	Monolingual	B

Note. A +2 means 2-point increase in post-intervention and a –2 means a 2-point decrease post-intervention. A +2 means the student increased in their language acquisition and knowledge of mathematic concepts. A –2 means the student decreased in their knowledge of mathematic concepts. No change means students showed no growth nor decrease in their knowledge of concepts.

Figure 5 compares the aMath FastBridge fall scores to the aMath FastBridge late fall test scores between Student A, Student B, and Student C in the dual language classroom to Students D, E, F, and G in the monolingual classroom. The figure shows that 2 students, Student C from the dual language classroom and Student F from the monolingual classroom, did not increase their knowledge of math on the aMath FastBridge test. Student E from the monolingual classroom had the greatest increase on the test, going from a score of 197 to 206. Student D had the second largest increase, beginning with a score of 191 and having a late fall score of 197.

Language Development During Intervention

The intervention took place from Day 9 through Day 16. The interpreter translated academic mathematic terms used in the whole group math period.

Academic English is a more formal term used in the classroom. Academic words describe the content being taught during instruction and inform the students of the language needed to complete tasks on homework, tests, and other items done in the classroom. During the intervention, words such as subtraction, less than, greater than, lesser, greater, minus, equals, and so forth, were used to describe how to solve the problem. Colorín Colorado (2023) states, "Academic English is more demanding and complex than social English. An ELL student with social English proficiency may not necessarily have the academic English proficiency" (para. 4).

English learners who have high social skills are often confused to have high academic knowledge.

Figure 5

aMath FastBridge Pre-Intervention Fall Scores and Post-Intervention Late Fall Scores for All Students

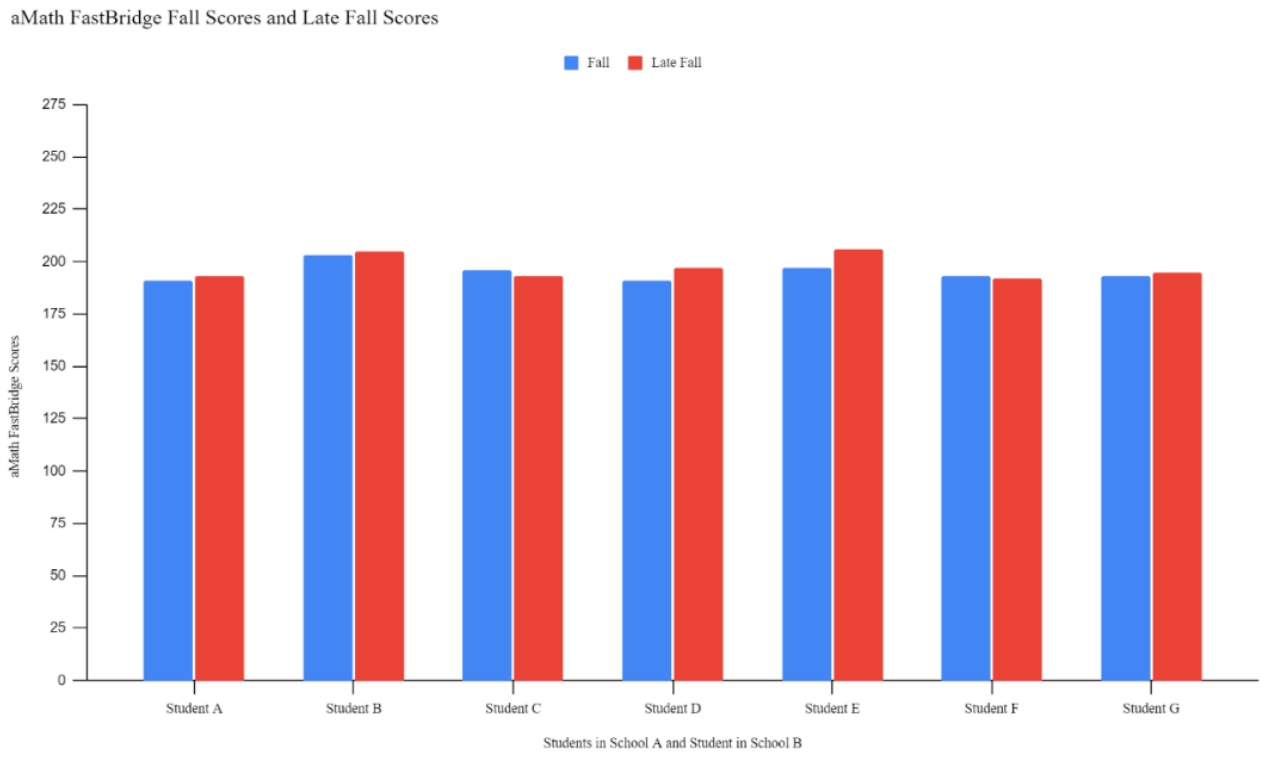


Figure 6 displays the amount of English words Student A used during the 8-day intervention. The figure also shows the academic language spoken as well as the Spanish language spoken in the dual language classroom. On Days 1 and 2, Student A spoke one hundred eleven words as well as 9 academic words. During the whole group math time on Day 3, Student A spoke 181 English words and only two of the words were academic. Student A also said six words in Spanish on Day 3. During the fourth observation, the student spoke 54 words as well as three academic words. On Day 5, the student spoke 197 words and three were academic words.

There was not an observation for Day 6 to display for Student A. The reason for this being the student was not aware they shut off the Voice Memo. In the final two observations, Student A spoke 121 and 131 words. The student also said three academic words during observation 7 and one academic word on observation 8. The total amount of English words Student A spoke was 908 during the observation, 14 academic words, and six Spanish words.

Figure 6

Student A's English, Academic English, and Spanish Spoken in the Dual Language Classroom During Intervention

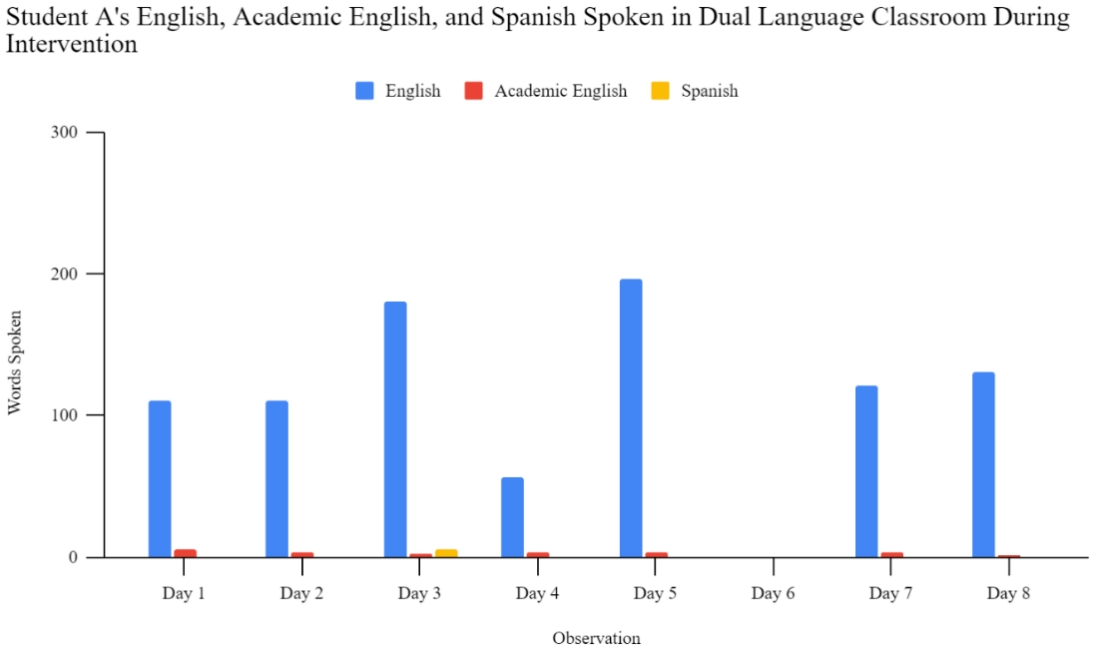


Figure 7 displays the number of English words, academic English words, and Spanish words spoken during the thirty-minute whole group mathematic time during the eight-day observation for Student B. During the thirty-minute period on day 1 the student spoke one 128 words. The student also stated five academic words and no Spanish. During observation 2, Student B spoke 100 English words and nine academic mathematic vocabulary words. There

were no Spanish words spoken during observation 2. On days 3 and 4, the student used 297 words and 77 words. The student also used 11 academic words on day 3 and 10 academic words on day 4. No Spanish words were used during the classroom period. During observation 5, Student B used 267 English words and five academic words. There were no Spanish words used. Student B used 227 words on day 6, thirty-five academic words, and no Spanish words again. Finally, during observations 7 and 8, the student used 247 English words and 299 English words. There was only one Spanish word used during observations 7 and 8, and eight academic words used in observation 7 and 23 academic words in observation 8. There was a total of 1,411 English words uttered or spoke during the 8 observations, 106 academic words used, and only one Spanish word used.

Figure 7

Student B's English, Academic English, and Spanish Spoken in the Dual Language Classroom During Intervention

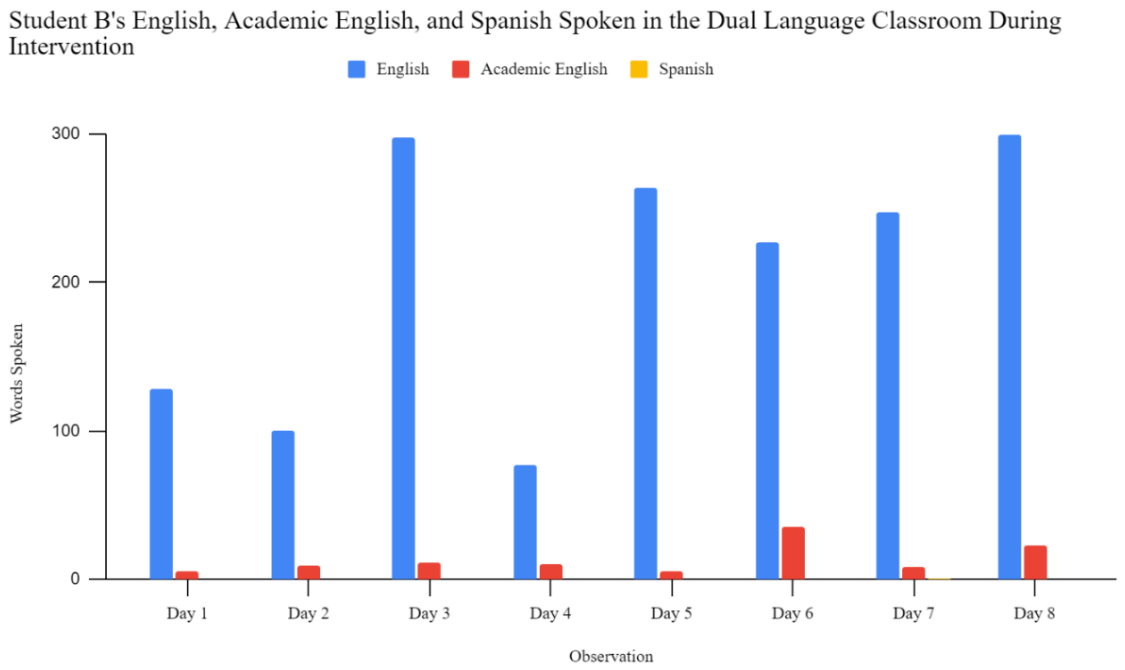


Figure 8 displays the observation from Student C and the student's use of English, academic English words, and Spanish used in the whole group mathematic classroom during the 8-day observation. On the first day of the dual language classroom post-intervention, Student C spoke 29 English words. Of those words, no words were academic or Spanish. During post-intervention 2, there were 38 English words spoken, two academic language words used, and one Spanish word. During the third post-intervention, 221 English words were used. There were also two academic words and 19 Spanish words used during the dual language class period. Sixteen English words were used during the fourth post-intervention as well as two academic words and four Spanish words. The student used 176 English words during post-intervention 5, two academic words, and no Spanish words. During post-intervention 6, Student B used 156 English words, four academic words, and five Spanish words. Finally, during post-interventions 7 and 8, the student used 76 and 115 English words, one academic English word, and no Spanish during both observations. Student B used a total of 877 English words, 13 academic mathematic words, and 29 Spanish words.

Figure 9 displays the comparison between the English used for Student A, Student B, and Student C during the intervention period. The line graph demonstrates that for each observation, the students were similar in their increase and decrease of English words used based on the activity and information being presented in class. Student B, however, has a larger negative effect in intervention 2, while Student A and Student C make an increase. During intervention 3, Student C made a larger gain in the English words used than for Student B. During the intervention on day 4, it was also homecoming. Students had the ability to purchase homecoming merchandise from the high school. The class period was significantly cut short to allow students time to look through the homecoming merchandise. During intervention day 5, Student B spoke

the most English words with two hundred sixty-four. During this day Student A also spoke one hundred ninety-seven words and Student C spoke one hundred seventy-six. Overall, Student B consistently demonstrated more use of English words than Student B and Student C. Student A unfortunately did not record during intervention 6. The researcher did not collect data later for Student A as it would have miscued the observation. When Student A was asked about the recording later, the student stated they were unaware that they had stopped the recording before the intervention took place. The overall number of English words spoken for Student A was nine hundred eight English words. Student B was the highest English speaker during the research with one thousand four hundred eleven words. Finally, Student C spoke eight hundred twenty-seven words.

Figure 8

Student C's English, Academic English, and Spanish Spoken in the Dual Language Classroom During Intervention

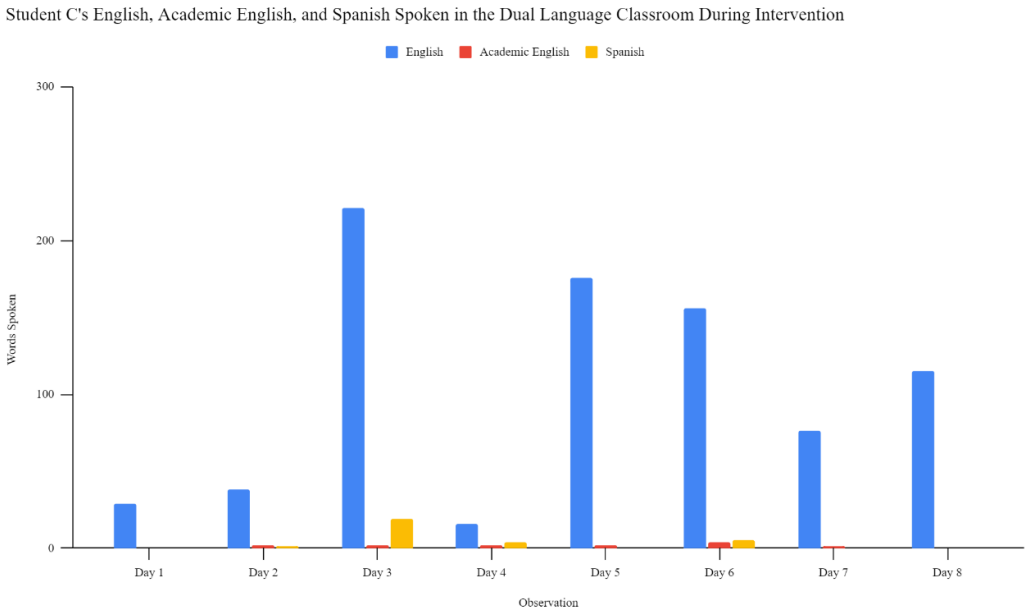


Figure 9

Comparison of English Used in the Dual Language Classroom Among the Participants

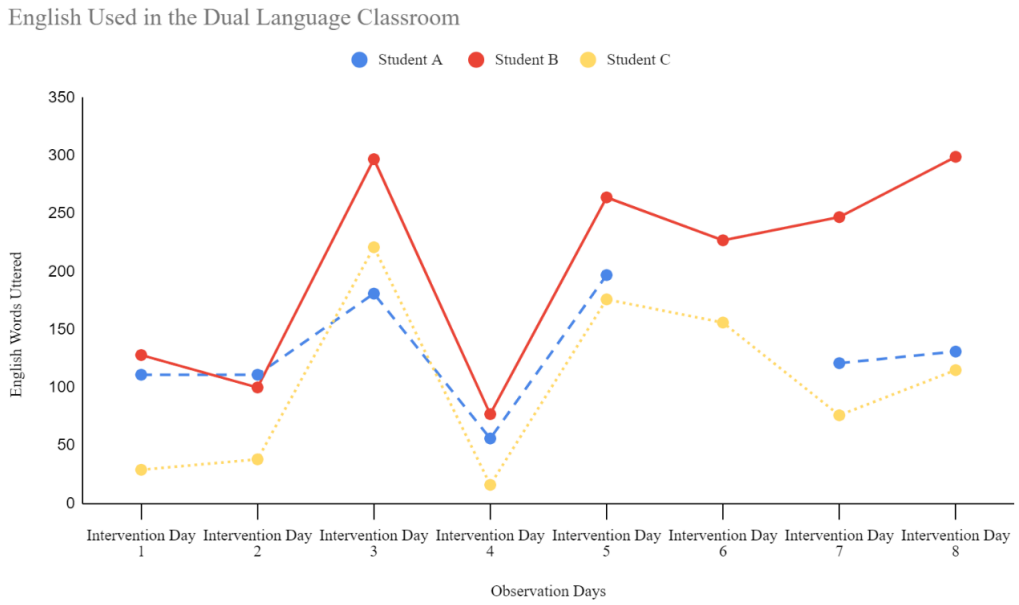


Figure 10 displays the over-all Academic English words spoken for Student A, Student B, and Student C. During the post-intervention period, Student B used a total of one hundred six academic English words in the mathematic classroom. Student A used twenty-one academic words and Student C used thirteen.

Figure 11 displays the total Spanish words spoken for Student A, Student B, and Student C. Student B had the least number of Spanish words used with one. Student A used six Spanish words and Student C used 29 Spanish words during the observations.

Figure 10

Academic English Words Spoken for Student A, Student B, and Student C

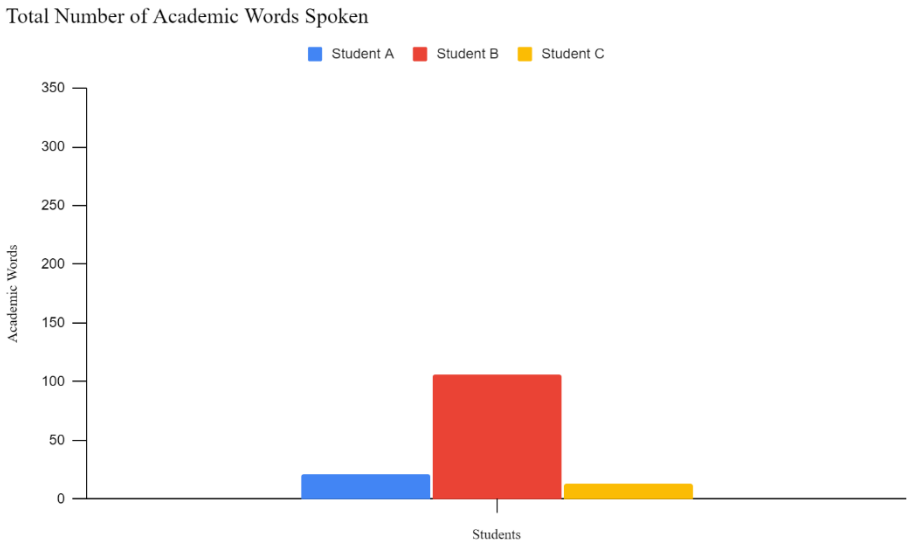
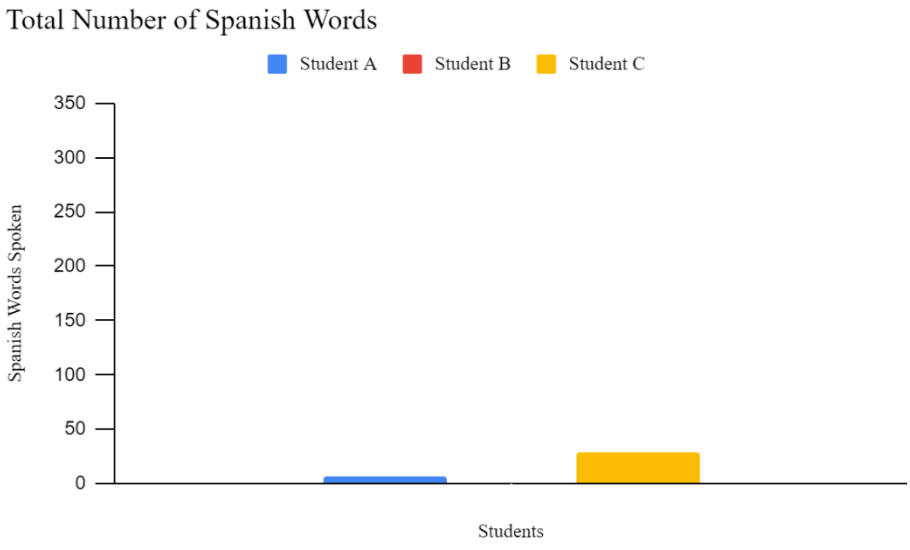


Figure 11

Total Number of Spanish Words Spoken



Post-Intervention Interviews

Post-Test Interview Questions. After the implementation of the dual language classroom as well as taking the Late Fall aMath FastBridge assessment, each participant in the dual language classroom sat down with the researcher and interpreter individually to reflect on their thoughts of the dual language classroom. Although an interpreter was not present during the first interview, it was important that the interpreter be a part of the post-interview to let students fully comprehend the questions and answer to their full ability. This method eliminated any language barriers to answer the questions. Student A and Student C wanted to answer all the post-interview questions in Spanish while Student B wanted to use English to respond.

The first question had students reflect on their experience about having the Spanish interpreter coming into the classroom. Student A took a long pause and thought to comprehend and answer this question. The interpreter reiterated the question in Spanish to see if this would help Student A reflect more on how she felt. Student A said she felt happy because she liked it when there was Spanish and English. The interpreter also asked in English if it made it easier in the classroom and Student A said yes. Student B thought it was harder with two people speaking. When the researcher restated what Student B said she changed her mind and said, *"Easy,"* and that she felt *"Good because she was teaching us, some people might not know how to speak it in English and so she's teaching us how to do it in Spanish."*

Student C was again very quiet like in the first interview and took a lot of time to think. She initially said she felt, *"Happy because I can learn things in Spanish so I can tell my mom."*

The second post-test interview question had the students reflect on their feelings towards the dual language classroom. Student A said, *"bien."* She felt good. Student B also said she felt good, and Student C said she felt *"very happy."*

The third interview question was about the student's work ethic in the classroom and if having a dual language classroom made them work harder, not hard, or no change. Student A had the most difficult time answering this question in both Spanish and English. When the interpreter repeated the question in Spanish and gave examples the student said she worked harder because of the interpreter being in the classroom. Student B said the work effort was easier, but not a lot easier. She did not have a change in the way she was driven to work in the classroom prior to the interpreter. Finally, Student C, after a long wait period, used a head gesture to affirm. She then responded to the interpreter in Spanish and said she felt she worked harder because *"It was easier to understand."* The student was reflecting that her motivation to learn was impacted because the content was in her L1.

Question four reflected around how well the students understood the math content. The researcher wanted to understand if the students felt if having an interpreter in the classroom and changing the monolingual classroom to dual language, they knew the content better or they did not see a difference. Student A said, *"It was better to understand."* Student B, however, said she knew the math concepts *"Better."* Student C also said she knew the math concepts better but could not elaborate on why. The researcher asked if it was because the interpreter translated everything, and the student said *"yes."*

The fifth post-test question was about the students' thoughts of having the classroom be dual language every single day or keep it monolingual and why. Student A took a long pause again to respond. The interpreter provided examples and questions in Spanish about what the student was thinking to help. Student A said she wished the classroom stayed with both a Spanish speaker and an English speaker because having a Spanish speaker in the room was easier. *"Then, then, I will hear what she will speak in Spanish."*

Student B wishes that she had both a Spanish speaker and English speaker every day because she saw the teacher and translator as both people teaching them. Student C also wishes that she had a dual language classroom every single day because *"It would make it easier if my mom had a question in Spanish to explain it to her, and it would be nice to have a teacher that spoke Spanish that could easily speak to my mom one on one."*

In the sixth question, the researcher had the students explain what they would tell the classroom teacher about having both Spanish and English in the classroom if their classroom teacher was sitting in the room. Student A, after a long pause and multiple examples in Spanish said, *"Yes, it would make it easier for me to understand. I like when Mrs. ____ stay in my classroom and Miss ____ too."* She also added that she liked the dual language classroom because one teacher spoke her language at home and not English all the time. Student B said, *"It's better to speak Spanish and English."* Student C stated again that it really helped her out.

Last, but not least, the students were asked about their knowledge of Spanish during instruction time. This allowed the researcher to determine how much Spanish the student knew throughout the classroom whole group instruction. This question helped the researcher determine the extent of bilingualism the student has. Student A took a long pause to respond. She then said, after help from the interpreter with examples, *"No tanto,"* meaning some words were difficult to understand even in the Spanish language during whole group math instruction time. Student B stated she could understand *"only some words."* Student C stated, *"It was really easy to understand in Spanish."*

Post-Intervention Interview Questions Teacher and Interpreter. The researcher met with the teacher and interpreter after the implementation of the dual language classroom. The researcher

wanted to understand the point of view from their perspective to see how they think the students did and felt during the dual language classroom.

In the first question, the researcher wanted to know if the classroom teacher and interpreter had any experience in a dual language classroom. Both participants did not have any experience prior to the research working in a dual language classroom. However, the classroom teacher stated that she does have experience with bilingual students. In this instance, she uses whatever knowledge of Spanish she has to communicate to her fullest to the Spanish speaking students.

The second question was about how the teacher and interpreter knew or determined who was going to speak during instructional time. The teacher stated, *"It was rocky to know when to exactly stop, so that she (interpreter), had time to interpret and what exactly she would interpret that I said."*

She continued saying, "*But, probably after the first day's lesson, we seemed to figure out much better how to make it work the most effectively and efficiently."*

The interpreter had similar feelings towards the beginning of implementing the dual language classroom. She stated, *"At first it was challenging to know when I could start interpreting or if I should wait. After the first day we kind of got the hang of it. We would make eye contact to let one another know that we were done speaking."*

Both individuals felt as if their overall experience was good. The interpreter stated, *"I loved it. I think it overall went great and it was nice to see that from the looks of the students' eyes it was really helping them out."*

The classroom teacher also stated she thought it was great. However, the need to make sure there was enough time in the lesson was the most difficult task prior to just planning for a

monolingual classroom. She stated, *"I had to plan a bit longer for my lessons each day to ensure that I wasn't rushing and allowing the extra time that was needed for the interpreting to occur."*

The researcher then asked how the interpreter and classroom teacher felt the students reacted to the dual language classroom from the first day compared to the final day. The teacher said she felt the students were confused on day one, even though they were aware of what was going to occur. She also stated, "*I also would say they were very interested in it as well. A majority of my students speak Spanish as well, so they could understand what (interpreter) was saying. (All but 4 of my 20 can speak/understand Spanish). I think it was eye-opening for my non-Spanish speakers to see how this works/listen to fluent academic Spanish. By the last day, I would say it was just like any other day in our classroom, it was now part of the normal routine. I also think a lot of my students were sad that it was (interpreter's) last day."*

The interpreter responded to this question by saying, *"I think the students did great. It was amazing to see how well they were behaving since the first day. They were great listeners and followed directions right away."*

In the fifth question, the researcher wanted to gain a better understanding of what the interpreter and classroom teacher thought about the idea of incorporating more dual language classrooms into a school district with a large English language population. Both teachers believe that it would be beneficial. It would consist of a major change to the way things are being done in a monolingual district as the teacher stated. However, the interpreter stated, *"You could see their (EL students) lightbulbs turn on."*

In the final question, the researcher asked what three things each person would change if the dual language classroom was implemented again. The classroom teacher stated, *"Time to plan/share the lesson ahead of time with the interpreter in the parallel of co-planning, trying the*

dual language classroom during a different subject, and finally having the interpreter stay to interpret my small group math lessons."

The interpreter had a similar answer regarding co-planning. She stated that one of her changes was to "Meet with the classroom teacher prior to speaking." The interpreter also said during the interview that she *"would like to be able to meet with the EL students after the lesson to see if they are understanding. It can get challenging interpreting in Spanish and wanting to add more but the lesson needs to go on for the rest of the students."*

The interpreter could not think of a third improvement for the implementation of a dual language classroom, but she liked getting the lesson ahead of time. *"I was able to practice the different terms and it helped the lesson go by smoother I feel because I was already prepared on what the lesson would be about."*

Summary of Research Question

Primary Research Question

1. What is the aMath FastBridge performance difference between developing English learners who were taught in a dual language classroom versus developing English learners taught in a monolingual classroom?

aMath FastBridge assessments scores for Student A, B, and C in the dual language classroom did not have a significant difference in aMath FastBridge scores when compared to Student D, E, F, and G in the monolingual classroom from School A and monolingual classroom in School B. In fact, Student A, Student B, and Student C had a slight decrease in overall assessment scores as compared Student D, Student E, Student F, and Student G. This information is fascinating given all the positive research completed that states dual language classrooms help to increase academic achievement because of the use of students' first language. The researcher

had to question what the monolingual classroom from School A and School B were doing that helped students to excel further than Student A, Student B, and Student C.

Although the aMath FastBridge assessment scores as shown in Figure 7 showed no significant increase as compared to students from the monolingual classrooms from School A and School B, the number of English words spoken during the thirty-minute whole group mathematic time did increase during intervention as compared to the pre-intervention for the students in the dual language classroom. However, the number of English words spoken varied each intervention observation. Student B continued to have the highest spoken words when compared to Student A and Student C. Student A was second in the number of spoken words, and Student C had the lowest.

The Academic English words continued to increase for Student B and Student A during the intervention. Student C, however, had the least amount speaking only fifteen words in the eight intervention days. Student C showed the highest number of Spanish words spoken during the intervention, which were not academic. Student A, Student B, and Student C did not feel having an interpreter in the classroom changed their motivation to work harder, but the content information became easier for them to comprehend.

Conclusion

This chapter presented the data organized to respond to the research question. Based on the findings, the aMath FastBridge performance between developing English learners in a dual language classroom compared to developing English learners in a monolingual classroom (RQ1) did not have a significant difference. The null hypothesis was accepted. Chapter 5 will present an interpretation of the findings and implications for practice. It will also provide the limitations of the study and recommendations for further research.

CHAPTER 5. DISCUSSION

Dual language programs foster academic needs of English language learners (ELL) using the English language as well as building off ELLs first language (L1). The goal of a dual language program is to bring culture awareness to student's learning and create a positive environment for all students' culture while learning academics. The researcher, an English language teacher in School A, investigated the comparison of the Late Fall aMath FastBridge assessment scores between *developing* English learners in a third-grade dual language classroom to *developing* English learners in two third-grade monolingual classrooms. A single-subject AB quasi-experimental study exploring the impact of dual language and monolingual classrooms on achievement in a mathematics classroom was developed for this research. English language learners at the *developing* stage of English language participated in this study. The English learners also had an aMath FastBridge assessment score no greater than 204. The significance of the study was that a third-grade monolingual classroom was transformed into a dual language classroom within a monolingual school in rural Minnesota. The researcher wanted to see if there were significant positive effects in the Late Fall aMath FastBridge assessments from the participants in the dual language classroom compared to the monolingual classrooms. This work was based off the Common Underlying Proficiency (CUP) Theory by James Cummins. The theory states that if students learn content in their first language, they can build off that knowledge to comprehend instruction in their second language (Cummins, 1984; 2000). Additionally, the researcher asked pre-and post–intervention interview questions to Students A, B, and C to gain more insightful information about the way students felt having their first language used in the classroom for the very first time to aid in their learning. The classroom teacher and Spanish interpreter were asked a series of questions separately post-intervention to

explore their thoughts on the intervention process. This final chapter discusses the summary of the findings. The researcher discusses the implications of these findings and suggestions for future research.

Summary of Findings

The data collected in this study was guided by the following research question:

What is the aMath FastBridge performance difference between developing English learners who were taught in a dual language classroom versus developing English learners taught in a monolingual classroom?

Developing English learners, according to the district EL handbook policy, are students that require 30-minutes of English language development (ELD) instruction five times per week (Department of Learning and Teaching, 2023). The English learners who were selected for the study had an Assessing Comprehension and Communication in English State-to-State (ACCESS) score between 3.0 and 3.4 from the Spring 2023 ACCESS test. The information for this state test score is found in Appendix G. Two monolingual classrooms were included for comparison purposes, one from the same district as the dual language classroom and the other from a neighboring district with a similar English learner (EL) population.

Students A, B, and C in the Dual Language Classroom

All three participants from the dual language classroom demonstrated varying levels of increase or decrease on aMath FastBridge Late Fall scores. Student B had the highest increase in aMath FastBridge assessment score as compared to Students A and C in the dual language classroom. Student A had the second most increase and Student C showed a decrease in the aMath FastBridge assessment. It was also found that Student B had an increase in academic

English language the most during the mathematics classroom period compared to Students A and C.

Students A, B, and C Compared to Students D, E, F, and G

Students A, B, and C from the dual language classroom did not have a significant increase in aMath FastBridge assessment scores compared to their peers from the monolingual classrooms. The results indicated the monolingual classroom participants had varying achievement scores as well. However, the monolingual classrooms had the most growth overall when compared to Students A, B, and C in the dual language classroom.

Discussion of Findings

Participants

Findings from the present study accepted the null hypothesis. Students A, B, and C did not have a significant increase in aMath FastBridge assessment scores compared to their peers in the monolingual classrooms. Based on the work by Pascopella (2013), dual language programs that excel receive funding from the state to offer teachers opportunities for professional development, the curriculum in both languages and materials. The teacher and interpreter were selected based on the researcher knowing the two individuals and their willingness to participate in the study. The researcher had originally requested a bilingual English language teacher to participate since she uses bilingualism when teaching her Spanish English learners. The teacher declined due to personal reasons. Therefore, the teacher and interpreter in the study were prepared to participate in the research with high hopes of making a lasting impression on the ELLs and learning more about what makes an effective dual language classroom. Although the teachers were ready to teach, professional development was not available to them to enhance their learning about the needs of dual language programs. Professional development must be

accepted by the district. The district is monolingual and does not use dual language instruction in any of the classrooms. The learning and discussions came from the researcher. The researcher used her knowledge from other studies conducted about successful dual language classrooms to foster the best information to help set up a dual language classroom for this study. This was the first time a dual language classroom would be implemented.

Another component of the dual language classroom that may have helped students A, B, and C be more successful is the curriculum in both Spanish and English as well as the materials. Dual language programs are "taught literacy and content in two languages" (Dual Language of New Mexico, para. 1, n.d.). Because there was no funding available for this research project, there were no funds for a new curriculum in Spanish and materials. This would have been very beneficial; however, the monolingual district has never purchased a bilingual curriculum because although there is a need, the school approach to addressing the academic needs of bilingual students never included an additive language model. Instead, the teachers in the district sought out help from the school interpreter or searched for resources on their own. The intervention was to use the interpreter during whole group math time and translate instruction 50:50.

Frequency count of English, academic English, and Spanish words were recorded, and a pattern reflected the growth of Students A and B and decrease in growth from Student C. Student B had the greatest growth in academic language and English used in the classroom. The same pattern is also shown for Student A who had growth and excelled in their English and academic English vocabulary. Student C who used the most Spanish, and fewest English, did not make growth. This underlying factor could have played a role in their achievement on the Late Fall aMath FastBridge test.

Student Pre – and Post – Intervention Interviews

This was the first time a dual language classroom was incorporated in the monolingual school district. While the results demonstrated that in this study there was not a significant difference in Late Fall aMath FastBridge assessment scores, it was important to reflect on the pre-and post-intervention interviews conducted by the researcher. The interviews allowed the participants to have their own voice heard. Prior research has not incorporated the lens of the students who are going through the process of a dual language classroom for the very first time. The interviews helped gain insight into the way students felt before the dual language classroom and after the intervention took place.

Pre-Intervention Interviews. After interviewing Students A, B, and C, the researcher decided that no student participating in the study was fearful of being in the classroom nor had ill feelings towards anyone, including the teacher. Based on the pre-intervention interview, the researcher decided that everyone felt they did well in school. The researcher did find out that each student involved expressed that they spoke more Spanish to peers in the classroom and outside of the classroom as compared to when they talk with their teacher. The researcher believes students have become accustomed to the monolingual school district where classroom content is only instructed in English and the teacher only knows English too.

Post-Intervention Interviews. The participants had a positive experience in the dual language classroom and the incorporation of a dual language classroom made a lasting impression. The participants stated they would want more interpretation in their class periods to understand the material. Students A, B, and C reflected on how much their peers would also understand the content because it was being instructed in their Spanish language. Student A stated, “Then my friends know the answer too and I can tell my mom.*”* Student B reflected on

the classroom being easier when both languages were spoken to instruct on the mathematic content. She stated initially it was hard, but after the first day and getting used to the two teachers the student stated, “It was easier.” Student B also said, “It was good because some of my friends might not know English and she was teaching us to do it in Spanish.” She continued to say, “It’s better to teach us in English and Spanish.” The positive answers each student gave showed how empathetic they were to their classmates learning in the intervention. The responses also demonstrated an understanding that students are aware they must speak English to the teacher because the teacher does not speak Spanish.

Classroom Teacher and Interpreter Post-Intervention Interview

Post-intervention interviews were also conducted separately with the classroom teacher and interpreter. The researcher wanted honest answers on how to make a dual language classroom better if used again in the monolingual district. The overall feedback of the research was positive. Both the classroom teacher and interpreter felt implementing a dual language classroom helped benefit all the students because having to understand a language other than English has never been needed. Learning how to incorporate the dual language classroom was a learning experience for each because they too have never been in a dual language classroom. When asked about how they (classroom teacher and interpreter) knew or determined who was going to speak as well as when, the classroom teacher stated it was “rocky” at first, but by the end of the four-week intervention, the classroom was just like any other ordinary day. The interpreter felt the same way and added that eye contact between the teacher and interpreter became a sign for who should talk next. The teacher and interpreter were informed that the classroom would represent a 50:50 model. The researcher determined the number of mathematical terms, word problems, and content that had to be taught would be divided equally

because it was the best scenario for the population of the classroom. This again was also the very first-time dual language would be implemented in the monolingual school. If the researcher chose the 90:10 model, this would mean the instruction would be ninety percent in Spanish. This would not work because the students were hearing Spanish in the classroom for the very first time. All of the students were not Spanish speakers and dual language programs typically begin in Kindergarten (Dual Language Education of New Mexico, n.d.) so that all students can learn the corresponding language. Both the teacher and interpreter were informed about what a dual language classroom required and the overall effectiveness research has shown about it. The interpreter and teacher had worked together in student conferences where they had already practiced when to speak and then allow sufficient time for interpretation.

Although the teacher and interpreter had previously worked together during conferences, the interpreter did not work in the school district. Therefore, the interpreter had to request time off from her current job to interpret in the classroom. Even though she was available for the days required for the study, this limited the amount of time to plan the details of the lesson before the lesson started. It became consistent after the first day how to introduce the content and when to allow one another to talk. The researcher was available to add tips or suggestions when asked. The researcher discussed the lesson with the teacher and interpreter and improvements that were needed after lessons. The interpreter added that she would recommend being able to talk with the Spanish-speaking students after the lesson to ensure the Spanish speakers understood the content and discuss more questions in Spanish than she was able to in the classroom with non-Spanish speakers.

The overall feeling from the classroom teacher and interpreter is that larger EL populations would benefit from something like a dual language classroom. The interpreter stated,

"I could see their little light bulb[s] turn on." The classroom teacher added that teachers would need an adjustment period because it is like nothing that has been done before, but "After this experience, I definitely think that it would be a great benefit to the students!"

Considerations for Implementing a Dual Language Classroom

English Language Learners

Second language acquisition (SLA) are the 5 stages English learners (EL) take to learn a new language. Figure 12 displayed below shows the five stages of SLA further.

Figure 12

The 5 Stages of Second Language Acquisition

Stage	Characteristics	Approximate Time Frame
Stage I Pre-Production	No speech Minimal comprehension BICS	0 – 6 months
Stage II Early Production	1–2-word responses Mispronounces words BICS	6 months - 1 year
Stage III Speech Emergence	Simple sentences Grammar errors BICS	1 - 3 years
Stage IV Intermediate	Complex sentences Discourse BICS/CALP	3 - 5 years
Stage V Advanced	Native-like vocabulary Complex narration BICS/CALP	5 - 7 years

Understanding how the English skills are being acquired by the students in third grade had to be understood, especially when there is information about when students begin to produce academic language and social language. Student A, Student B, Student C, Student E, Student F, and Student G from School A and School B started in the district at kindergarten. At that time,

the students only knew Spanish as their first language. By the time Students A, B, C, D, E, F, and G reached third grade, they had only three years to acquire English speaking skills. According to Richarson (2021), in SLA, ELs can go through a silent period within the first six months. During this time, English learners are limited in their understanding of the second language as they are being exposed to it for the first time consistently. So mathematical terms and concepts may not yet be comprehended or practiced in the second language (L2). This stage is also known as the pre-production stage and is "somewhat comparable to the pre-talking and babbling stages of first language acquisition" (Richardson, 2021, para. 11). This information was also discussed earlier in Chapter 1 (p. 44). Pre-production is also the stage where students will listen and absorb the language but not speak it (Colorín Colorado, 2023). These skills are Basic Interpersonal Communication Skills or BICS. BICS provides students with their social language in order to communicate with others. BICS was also discussed more thoroughly in Chapter 1 (p. 25). After the six months, ELs who are "regularly exposed" (Richardson, 2021, para. 13) begin to use one to two-word phrases in English. In the third stage of SLA, when students are exposed to English after one to three years, they enter what is called the Speech Emergence stage. During this stage, the students should be able to speak in simple sentences as well as the expansion of words and sentences (Colorín Colorado, 2023). This means that by the time students have reached the third grade, they have been exposed to English regularly for about three years. It is important to remember that it takes students approximately 2 years to develop social skills but "are inadequate for the linguistic demands of upper elementary school and beyond" (IRIS, 2024). This information puts an important emphasis on the students' ability to expand and use vocabulary terms in math to understand correct vocabulary terms to excel on the aMath FastBridge assessment. If English learners need to use academic terms, it is not until after the third year we

read at Intermediate Fluency student can communicate fluently in their second language. It is also important to note that English learners acquire Cognitive Academic Language Proficiency (CALP) after five to seven years (ISIS, 2024). The students chosen for the research were all *developing* English learners having only been in the district since kindergarten and regularly practicing English for about 3 years at the time of the study.

However, Student D from School A has only received two years of English language services. Student D came from Guatemala with no English skills in the first grade, yet Student D had the second most growth compared to his peers. When looking at how BICS and CALP work, Student D is excelling in what has been studied. The researcher went back to the student's personal demographics from Table 6 in Chapter 4, and nothing stands out that is exceedingly different from his peers.

Evaluating Theoretical Framework

The theoretical framework for this study was based on the works of James Cummins and the Common Underlying Proficiency (CUP) Theory. As previously mentioned in Chapter 2 (p. 24), the CUP theory applies the basic interpersonal communication skills (BICS) and cognitive-academic language proficiency (CALP). BICS refers to the developed characteristics of communicative proficiency or, how students socialize in English. It was at the time when Cummins developed BICS, most educators believed this social criterion demonstrated students' academic language because students were able to hold conversations very well in English (Rivera, 1984). BICS was created to understand the difference between social language and academic language. This proceeded Cummins to create the theory of CALP to show that if students would understand academic English language in a classroom, they should then be viewed as English proficient (Rivera, 1984). The CUP theory demonstrates that when students

use both languages, and although different in their output, concepts are shared and knowledge is enhanced from both learning and experience (Ваютина, 2010). Because the participants were *developing* English language learners, they were not proficient in English. Also, there is not an assessment to determine how proficient English learners are in their first language. Although the intervention was shorter than dual language programs studied, the researcher had hoped there would be a significant difference between peers who are at the same ACCESS level. The mathematics content studied in the four weeks with the interpreter were also used throughout the next weeks of the quarter to work on multiplication skills. The researcher knew students had background knowledge in both Spanish and English from the dual language implementation to work on the skills in the classroom. The study concluded by the researcher will only help to enhance further research done to compare dual language classrooms to monolingual classrooms. The research completed in the third-grade classroom will help studies recognize that more research needs to be conducted to determine if students can succeed more than their peers in a dual language classroom that is implemented at any age in a monolingual district.

Implications of Findings

This study implies that a four-week dual language classroom focusing on translation of instruction does not make a significant difference in aMath FastBridge assessment scores. There were both positive effects and a negative effect on student test scores, but not enough to conclude the effect was about the dual language classroom. Post-intervention interviews with Students A, B, and C imply there was a difference in perception of the overall classroom moral. Student A, B, and C commented on how much they enjoyed having someone else in the classroom translate English words into Spanish. It was important to the participants from the

dual language classroom that all students in their classroom who are alike in not having English as a first language, be provided opportunities to listen to someone speak their first language.

It was observed by the researcher that Student A, B, and C had multiple opportunities to speak with partners in the whole group mathematic classroom. An interactive board, display of content, and multiple examples were provided to aid in student learning both in English and Spanish. The classroom teacher provided opportunities to read numbers and words with her and have it all interpreted in Spanish. It was also observed that the classroom teacher provided many opportunities for the interpreter to speak and help students understand the academic language of mathematics. In one instance, the students were supposed to be multiplying and instead were dividing. The interpreter said, "Mutliplicación" and an *"*Ohhh" erupted in the classroom signifying the students understood they solved the equation incorrectly.

It is well known through other research that dual language classrooms support learning for English language learners. There is evidence in this study that a dual language classroom needs to be implemented longer than a four-week time in a monolingual school district.

Recommendations for Further Research

Students were recorded using Voice Memo, an application found on Apple electronics. The researcher recommends that future participants wear a microphone, or a wearable device, so that students do not have to carry the iPad around the classroom with them. Providing wearable microphones would allow the students to move around and talk freely without having to remember to carry the iPad or conclude the recording when the mathematic class period is over.

Another recommendation is the time commitment to conduct the research. The research completed in School A was during a four-week period. During the four-week period, there were multiple activities going on within School A that may have hindered the learning of students

because of class time. These activities were unbeknownst to the researcher before the study. Extending the research into an entire quarter would provide more promising experiences for students to learn. Extending a dual language classroom for a quarter would also provide instruction while the students took the Fall and Late Fall tests. This would allow a better understanding of why students did or did not grow in their mathematical action words and instruction. Also, within a four-week period, there are risks of illnesses that could hinder the research because of the absence of the interpreter, student being studied, or teacher in the classroom.

Due to the discovery that Student A, B, and C had lower growth than Student D, E, F, and G, the researcher recommends also observing the small group classroom instruction or understanding what tasks the teachers in the monolingual classrooms do. The researcher speculates through prior knowledge that each classroom teacher worked on the same skill sets, but used different worksheets or activities to help students understand the academic language and skill being taught.

During the observation and recording period, there are specific academic words used within the content taught. For the purpose of this research, the researcher wanted to know if the number of academic English increased with intervention for Student A, B, and C. For future research, it would be important to record how often each term is used for everyone in the study. This would help to identify if there were specific academic words students were not saying because they were too difficult.

Another recommendation is writing a grant to conduct this research. The interpreter was volunteering her time to interpret in the classroom. Writing a grant would allow an interpreter to be paid for their time and prolong their commitment to the classroom. Although the interpreter

had a huge positive effect on all the students and their learning, she was also taking time out of her workday to complete the task.

A final recommendation is to inform parents of the importance of using their first language at home with their child. Because the school is monolingual, parents may feel that their child only needs to learn and understand English to be successful in school. Providing parents with a foundation to understand that by having conversations in their L1 at home, the students will progress more in school because they will transfer the information when presented in their L1 to comprehend and transfer to L2 better.

Conclusion

This study aimed to determine if the implementation of a dual language classroom in a monolingual school district had a greater impact on the Late Fall aMath FastBridge assessment as compared to two monolingual classrooms. Additionally, the researcher conducted a pre and post-intervention interview with Student A, Student B, and Student C, as well as with the classroom teacher and interpreter to allow the voices of the participants to be heard in this research.

Based on the findings, the study accepted the null hypothesis that there was no significant difference in the aMath FastBridge test between the dual language classroom and the two monolingual classrooms. However, the data did show that the students were similar in their testing ability. The researcher concludes that further research needs to be completed for a longer duration to make the conclusion that schools can implement a dual language classroom at any point in any grade level. Dual language classrooms are critical to bring in culture and allow students to hear information given in their first language.

School districts with high English language learner populations should consider implementing more opportunities for students to speak a language they are most comfortable with and to build on that information to speak English. Our schools continue to change. Districts need to start thinking with an out-of-the-box approach to reach students who do not use English as the first language.

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APPENDIX A: PERMISSIONS

March 30, 2023

To Whom It May Concern:

I am writing this letter of support for Mrs. Molly Scheidt in regards to her doctoral research project. Mrs. Scheidt has kept site and district leadership well informed of her intent to conduct this project in a 3rd grade classroom at Worthington Intermediate School during the 2023-2024 school year. We are aware student and parent information will be kept anonymous, and data will be used for the purpose of this research. Mrs. Scheidt has full support and approval from ISD 518 to move forward with this research.

I would welcome any questions you may have via phone or e-mail.

Sincerely,

Joshua Noble
Director of Instruction
Worthington, MN
josh.noble@isd518.net
507-727-1138

Round Lake/Brewster School District

915 4th Ave., P.O. Box 309, Brewster, MN 56119-0309
Phone: 507-842-5951 Fax: 507-842-5365
Ray Hassing – Superintendent Cathy Mrla – Principal

April 25, 2023

To Whom It May Concern:

I am writing this letter of support for Mrs. Molly Scheidt in regard to her doctoral research project. Mrs. Scheidt has informed us of her intentions to conduct this research project utilizing data from our 3rd grade classrooms at Round Lake Brewster School in the 2023-2024 school year. We are aware that student and parent information will be kept anonymous, and data will be used for the purpose of this research. Mrs. Scheidt has full support and approval from ISD 2907 to use the data for her research.

If you have additional concerns or questions, feel free to call or email for more information.

Best Regards,

Cathy Mrla

Cathy Mrla
Principal
Round Lake Brewster School
Brewster, MN 56172
Cathy.mrla@isd2907.org

APPENDIX B: IRB APPROVAL

Institutional Review Board

MINNESOTA STATE UNIVERSITY MOORHEAD

DATE: February 19, 2024

TO: Ximena Suarez-Sousa, B.S./M.S., Principal Investigator
Molly Scheidt, Co-investigator

FROM: Dr. Robert Nava, Chair
Minnesota State University Moorhead IRB

ACTION: APPROVED

PROJECT TITLE: [2119202-1] ASSESSING LANGUAGE LEARNERS IN MATHEMATICS: A SINGLE-SUBJECT AB QUASI-EXPERIMENTAL STUDY EXPLORING THE IMPACT OF DUAL LANGUAGE AND MONOLINGUAL CLASSROOMS ON ACHIEVEMENT
SUBMISSION TYPE: New Project
APPROVAL DATE: February 19, 2024
EXPIRATION DATE:
REVIEW TYPE: Exempt Review

Thank you for your submission of New Project materials for this project. The Minnesota State University Moorhead IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Exempt Review based on the applicable federal regulation.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Federal regulations require that each participant receives a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this committee prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others and SERIOUS and UNEXPECTED adverse events must be reported promptly to the Minnesota State University Moorhead IRB. Please use the appropriate reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to the Minnesota State University Moorhead IRB.

This project has been determined to be a project. Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your

documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of .

Please note that all research records must be retained for a minimum of three years after the completion of the project.

If you have any questions, please contact the Minnesota State University Moorhead IRB. Please include your project title and reference number in all correspondence with this committee.

This letter has been issued in accordance with all applicable regulations, and a copy is retained within Minnesota State University Moorhead's records.

APPENDIX C: PRE-TEST AND POST-TEST QUESTIONNAIRE

Pre-Test Questionnaire

1). What do you like about school?

2). What do you wish you could change about school if you could change anything?

3). What language do you speak most in school?

- Why do you speak that language?

4). What language do you wish you could speak the most in the classroom?

- Why do you feel that way?

5). Do you feel confident in school? Do you feel that you do well on schoolwork?

- Why do you feel that way?

Post-Test Questionnaire

1). What did you think when your math classroom had someone speak a language you know?

2). How did it make you feel?

3). How did this change the way you worked in the classroom?

4). Do you think you understood the content better or worse?

5). Is this something you wish you had all of the time?

- Why or why not?

6). What do you want to tell your teacher about having both Spanish and English in the classroom?

7). Was it easy to understand Spanish, or were there words you did not understand?

Post-Interview Teacher and Interpreter Questions

1. What knowledge or experience have you had in a dual language classroom?
2. How did you know or determine who was going to speak when going back and forth in the lesson and conversations?
3. What was your overall experience of implementing the dual language classroom?
4. How do you think the students responded to the dual language classroom comparing day 1 to the last day?
5. Do you think having a dual language classroom would be beneficial for schools with a large EL population?
6. What are three things you would change if you had to complete this research over again?

APPENDIX D: CONSENT FOR PARTICIPATION SCHOOL A

Institutional Review Board

Please read this consent agreement carefully before agreeing to participate in this study.

Dear _____,

You and your child are invited to participate in a study that helps the researcher, Mrs. Molly Scheidt, analyze the impact a third-grade bilingual mathematics classroom has on student learning as compared to a monolingual third-grade classroom. This study will help the researcher better understand how each learning environment affects the learning outcomes of English learning students. Your child has been selected to be a possible participant in this study because your child is:

1. A third grade EL student at Intermediate School Worthington
2. Bilingual – can speak both Spanish and English
3. Received an ACCESS score report of at least 3.0 – 3.4
4. Demonstrated an understanding of mathematics from Spring FAST test with a score of at least 190-204

If you decide to participate, your child will be asked interview questions at the beginning of the year, as well as in November. Your child will also be recorded during math classroom time. No discomforts or risks are expected from your engagement with this research other than the inconvenience of sitting down to an interview with the researcher. The benefit of your participation is for the researcher to identify factors that best support English learner students within a classroom.

Your participation will remain anonymous. Your child's data and teacher's data will remain private. There will be no possibility for you to become identified, your privacy is assured.

Your decision whether or not to participate will not affect your future relationships with Worthington Public Schools. If you decide to participate, you are free to discontinue participation at any time.

Please feel free to ask questions regarding this study. You may contact me if you have any questions via email at Molly.Scheidt@isd518.net or call Intermediate School extension 6323. Any questions about your rights may be directed to Dr. Robert Nava, Chair of MSUM Institutional Research Board, at irb@mnstate.edu, or 218-477-4308.

Agreement:

The purpose and nature of this research have been sufficiently explained and I agree to participate in this study. I understand that I am free to withdraw at any time and my withdrawal will not affect any future relationship with ____.

By initialing and signing, I am stating this consent form was translated to me by _____ in Spanish.

Initial of participant: _____Signature of participant:_____

Initial of Translator: _____Signature of translator:_____

In signing this agreement, I also affirm that I am at least 18 years of age or older.

Signature: _____ Date: _____

Name (print):_____

In signing this agreement, I also affirm that I am signing for my child to be a participant in this research.

Signature: _____ Date: _____

Name (print):_____

Thank you for your time. Sincerely,

Molly M. Scheidt
3rd Grade EL Teacher Intermediate School
MSU Moorhead Educational Leadership Doctoral Student

Junta de Revisión Institucional

Por favor lea atentamente este acuerdo de consentimiento antes de aceptar participar en este estudio.

Estimado/a _____,
Usted y su hijo están invitados a participar en un estudio que ayuda a la investigadora, la Sra. Molly Scheidt, a analizar el impacto que un aula bilingüe de matemáticas de tercer grado tiene en el aprendizaje de los estudiantes en comparación con un aula monolingüe de tercer grado. Este estudio ayudará a la investigadora a comprender mejor cómo cada entorno de aprendizaje afecta los resultados de aprendizaje de los estudiantes que aprenden inglés. Su hijo ha sido seleccionado para ser un posible participante en este estudio porque su hijo:

1. Es un estudiante de tercer grado de EL en la Escuela Intermedia Worthington
2. Es Bilingüe – puede hablar español e inglés
3. Recibió un informe de puntuación ACCESS de al menos 3.0 – 3.4.
4. Demostró una comprensión de las matemáticas de la prueba Spring FAST con una puntuación de 190-204

Si decide participar, se le harán preguntas de entrevista a su hijo a principios de año, y también en noviembre. Su hijo también será grabado durante el tiempo de clase de matemáticas. No se esperan molestias ni riesgos relacionados con su participación en esta investigación, aparte del inconveniente de sentarse a una entrevista con el investigador. El beneficio de su participación es que el investigador identifique los factores que más ayuden a los estudiantes de inglés dentro del salón de clases.

Su participación permanecerá anónima. Los datos de su hijo y los datos del maestro permanecerán privados. No habrá posibilidad de que usted sea identificado, su privacidad está asegurada.

Su decisión de participar o no participar no afectará sus relaciones futuras con las Escuelas Públicas de Worthington. Si decide participar, puede descontinuar la participación en cualquier momento.

Por favor, siéntase libre de hacer preguntas sobre este estudio. Si tiene alguna pregunta puede comunicarse conmigo por correo electrónico escribiendo a la dirección Molly.Scheidt@isd518.net o llame a la extensión de la Escuela Intermedia 6323. Cualquier pregunta sobre sus derechos puede dirigirse al Dr. Robert Nava, Presidente de la Junta de Investigación Institucional de MSUM, en irb@mnstate.edu, o al 218-477-4308.

Acuerdo:
El propósito y la naturaleza de esta investigación han sido suficientemente explicados y acepto participar en este estudio. Entiendo que tengo libertad de retirarme en cualquier momento y mi retiro no afectará ninguna relación futura con _____.

Al inicializar y firmar, estoy afirmando que este formulario de consentimiento me fue traducido por _____ al español.

Iniciales del participante: _____Firma del participante: _____
Iniciales del Traductor: _____Firma del traductor:_____

Al firmar este acuerdo, también afirmo que tengo al menos 18 años de edad o más.

Firma: _____ Fecha: _____

Nombre
(Impreso):_____

Al firmar este acuerdo, también afirmo que estoy firmando para que mi hijo participe en esta investigación.

Firma: _____ Fecha: _____

Nombre
(Impreso):_____

Gracias por su tiempo. Sinceramente,

Molly M. Scheidt
3er grado EL Teacher Intermediate School
MSU Moorhead Estudiante de Doctorado en Liderazgo Educativo

APPENDIX E: CONSENT FOR PARTICIPATION SCHOOL B

Institutional Review Board

Dear _____,

You and your child are invited to participate in a study that helps the researcher, Mrs. Molly Scheidt, analyze the impact a third-grade bilingual mathematics classroom has on student learning as compared to a monolingual third-grade classroom. This study will help the researcher better understand how each learning environment affects the learning outcomes of English learning students. You and your child have been selected to be a possible participant in this study because your child is:

1. A third grade EL student at Round Lake Brewster School
2. Bilingual – can speak both Spanish and English
3. Received an ACCESS score report of at least 3.0 - 3.4.
4. Demonstrated an understanding of mathematics from Spring FAST test with a score between 190 – 204

If you decide to participate, your child's aMath FastBridge score will be used for the purpose of comparing the score to a dual language classroom. No discomforts or risks are expected from your engagement with this research other than the inconvenience of sitting down to an interview with the researcher. The benefit of your participation is for the researcher to identify factors that best support English learner students within a classroom.

Your participation will remain anonymous. Your child's data and teacher's data will remain private and will be reported in an aggregated fashion. There will be no possibility for you to become identified, your privacy is assured.

Your decision whether or not to participate will not affect your future relationships with Round Lake School District. If you decide to participate, you are free to discontinue participation at any time.

Please feel free to ask questions regarding this study. You may contact me if you have any questions via email at Molly.Scheidt@isd518.net or call Intermediate School extension 6323. Any questions about your rights may be directed to Dr. Robert Nava, Chair of MSUM Institutional Research Board, at irb@mnstate.edu, or 218-477-4308.

Agreement:

The purpose and nature of this research have been sufficiently explained and I agree to participate in this study. I understand that I am free to withdraw at any time and my withdrawal will not affect any future relationship with the Round Lake Brewster School District.

Initial of participant: _____Signature of participant:_____

In signing this agreement, I also affirm that I am at least 18 years of age or older.

Signature: _____ Date: _____

Name
(print):_____

In signing this agreement, I also affirm that I am signing for my child to be a participant in this research.

Signature: _____ Date: _____

Name
(print):_____

Thank you for your time. Sincerely,

Molly M. Scheidt
3rd Grade EL Teacher Intermediate School
MSU Moorhead Educational Leadership Doctoral Student

Junta de Revisión Institucional

Por favor lea atentamente este acuerdo de consentimiento antes de aceptar participar en este estudio.

Estimado/a _____,

Usted y su hijo están invitados a participar en un estudio que ayuda a la investigadora, la Sra. Molly Scheidt, a analizar el impacto que un aula bilingüe de matemáticas de tercer grado tiene en el aprendizaje de los estudiantes en comparación con un aula monolingüe de tercer grado. Este estudio ayudará a la investigadora a comprender mejor cómo cada entorno de aprendizaje afecta los resultados de aprendizaje de los estudiantes que aprenden inglés. Su hijo ha sido seleccionado para ser un posible participante en este estudio porque su hijo:

1. Es un estudiante de tercer grado de EL en la escuela Round Lake en Brewster
2. Es Bilingüe – puede hablar español e inglés
3. Recibió un informe de puntuación ACCESS de al menos 3.0 – 3.4.
4. Demostró una comprensión de las matemáticas de la prueba Spring FAST con una puntuación de 190-204.

Si decide participar, se les pedirá a usted y a su hijo que se entrevisten durante las conferencias a principios de año en agosto, así como en las conferencias en noviembre del mismo año. No se esperan molestias ni riesgos por involucrarse con esta investigación, aparte de la inconveniencia de sentarse a una entrevista con el investigador. El beneficio de su participación es que el investigador identifique los factores que mejor apoyen a los estudiantes que aprenden inglés dentro de un aula.

Su participación permanecerá anónima. Los datos de su hijo y los datos del maestro permanecerán privados. No habrá posibilidad de que usted sea identificado, su privacidad está asegurada.

Su decisión de participar o no participar no afectará sus relaciones futuras con las Escuelas Públicas de Worthington. Si decide participar, puede descontinuar la participación en cualquier momento.

Por favor, siéntase libre de hacer preguntas sobre este estudio. Si tiene alguna pregunta puede comunicarse conmigo por correo electrónico escribiendo a la dirección Molly.Scheidt@isd518.net o llame a la extensión de la Escuela Intermedia 6323. Cualquier pregunta sobre sus derechos puede dirigirse al Dr. Robert Nava, Presidente de la Junta de Investigación Institucional de MSUM, en irb@mnstate.edu, o al 218-477-4308.

Acuerdo:
El propósito y la naturaleza de esta investigación han sido suficientemente explicados y acepto participar en este estudio. Entiendo que tengo libertad de retirarme en cualquier momento y mi retiro no afectará ninguna relación futura con el distrito escolar de Round Lake Brewster.

Iniciales del participante: _____Firma del participante: _____

Al firmar este acuerdo, también afirmo que tengo al menos 18 años de edad o más.

Firma: _____ Fecha: _____

Nombre (Impreso): _____

Al firmar este acuerdo, también afirmo que estoy firmando para que mi hijo participe en esta investigación.

Firma: _____ Fecha: _____

Nombre (Impreso): _____

Gracias por su tiempo. Sinceramente

Molly M. Scheidt
3er grado EL Teacher Intermediate School
MSU Moorhead Estudiante de Doctorado en Liderazgo Educativo

APPENDIX F: NOTIFICATION LETTER OF STUDY

Dear Parents/Guardians,

It is hard to believe that the 2023 – 2024 school year is quickly approaching. As teachers work to get their classrooms ready to be filled with learning, laughter, and students, I know that this will be a great school year.

My name is Molly Scheidt and I am a third grade English learner teacher at Intermediate School. I am earning a Doctor of Education (EdD) degree from Minnesota State University Moorhead. I am in my final year of school and will tentatively graduate in May 2024.

My dissertation topic is: ASSESSING LANGUAGE LEARNERS IN MATHEMATICS: A SINGLE-SUBJECT AB QUASI-EXPERIMENTAL STUDY EXPLORING THE IMPACT OF DUAL LANGUAGE AND MONOLINGUAL CLASSROOMS ON ACHIEVEMENT The research that I am conducting will take place in your child's classroom.

What does this mean? This means that for a two-week period in the months of September, October, math action words (less than, more than, multiplier, divisor, etc), will be translated while the classroom teacher teaches. Your child's learning will not be affected, but hopefully enhanced due to the bilingual vocabulary that will be used to help all students succeed.

English learners have already been selected as part of this research. This letter is to inform you that your child will see and hear things bilingually in *only* the math classroom. Again, this will not hinder your child's learning capability, but hopefully expand his/her knowledge.

I plan on attending your child's back to school conference should you have any questions or concerns.

Should you have any questions or concerns right now, please contact me by email at Molly.Scheidt@isd518.net or by phone at Intermediate School 507 – 727 -1275 extension 6323.

Thank you. Sincerely,

Molly M. Scheidt
3rd Grade EL Teacher Intermediate School
MSU Moorhead Educational Leadership Doctoral Student

Estimados padres/tutores,

Es difícil creer que el año escolar 2023 – 2024 se acerque rápidamente. A medida que los maestros trabajan para preparar sus aulas para llenarse de aprendizaje, risas y estudiantes, sé que este será un magnífico año escolar.

Mi nombre es Molly Scheidt y soy maestra de inglés de tercer grado en la Escuela Intermedia. Estoy obteniendo un título de Doctor en Educación (EdD) de Minnesota State University Moorhead. Estoy en mi último año de clase y me graduaré tentativamente en mayo de 2024.

El tema de mi tesis doctoral es: EVALUACIÓN DEL DESEMPEÑO MATEMÁTICO DE LOS ESTUDIANTES DE IDIOMAS TANTO EN UN AULA BILINGÜE COMO EN UN AULA MONOLINGÜE. La investigación que estoy llevando a cabo se llevará a cabo en el aula de su hijo.

¿Qué significa esto? Esto significa que durante un período de dos semanas en los meses de septiembre, y octubre, las palabras de acciones matemáticas (o sea, menos que, más que, multiplicado por, dividido por, etc.), se traducirán mientras el maestro del aula enseña. El aprendizaje de su hijo no se verá afectado, pero ojalá mejore debido al vocabulario bilingüe que se utilizará para ayudar a todos los estudiantes a tener éxito.

Los estudiantes de inglés ya han sido seleccionados como parte de esta investigación. Esta carta es para informarle que su hijo verá y escuchará cosas bilingües *solamente* en el aula de matemáticas. Una vez más, esto no obstaculizará el aprendizaje de su hijo, pero esperamos que amplíe su conocimiento.

Planeo asistir a la conferencia de su hijo al regresar a clases por si tiene alguna pregunta o inquietud.

Si tiene alguna pregunta o inquietud en este momento, comuníquese conmigo por correo electrónico a Molly.Scheidt@isd518.net o por teléfono a la Escuela Intermedia 507-727-1275 extensión 6323.

Gracias. Atentamente

Molly M. Scheidt
Maestra de Inglés de 3er grado de la Escuela Intermedia
Estudiante de MSU Moorhead Educational Leadership Doctoral

APPENDIX G: THE ENGLISH LEARNER CAN DO BOOKLET

WIDA CONSORTIUM

Can Do Descriptors: Grade Level Cluster 3-5

For the given level of English language proficiency and with visual, graphic, or interactive support through Level 4, English language learners can process or produce the **language** needed to:

	Level 1 Entering	Level 2 Beginning	Level 3 Developing	Level 4 Expanding	Level 5 Bridging	Level 6 - Reaching
LISTENING	• Point to stated pictures, words, or phrases • Follow one-step oral directions (e.g., physically or through drawings) • Identify objects, figures, people from oral statements or questions (e.g., "Which one is a rock?") • Match classroom oral language to daily routines	• Categorize content-based pictures or objects from oral descriptions • Arrange pictures or objects per oral information • Follow two-step oral directions • Draw in response to oral descriptions • Evaluate oral information (e.g., about lunch options)	• Follow multi-step oral directions • Identify illustrated main ideas from paragraph-level oral discourse • Match literal meanings of oral descriptions or oral reading to illustrations • Sequence pictures from oral stories, processes, or procedures	• Interpret oral information and apply to new situations • Identify illustrated main ideas and supporting details from oral discourse • Infer from and act on oral information • Role play the work of authors, mathematicians, scientists, historians from oral readings, videos, or multi-media	• Carry out oral instructions containing grade-level, content-based language • Construct models or use manipulatives to problem-solve based on oral discourse • Distinguish between literal and figurative language in oral discourse • Form opinions of people, places, or ideas from oral scenarios	
SPEAKING	• Express basic needs or conditions • Name pre-taught objects, people, diagrams, or pictures • Recite words or phrases from pictures of everyday objects and oral modeling • Answer yes/no and choice questions	• Ask simple, everyday questions (e.g., "Who is absent?") • Restate content-based facts • Describe pictures, events, objects, or people using phrases or short sentences • Share basic social information with peers	• Answer simple content-based questions • Re/tell short stories or events • Make predictions or hypotheses from discourse • Offer solutions to social conflict • Present content-based information • Engage in problem-solving	• Answer opinion questions with supporting details • Discuss stories, issues, and concepts • Give content-based oral reports • Offer creative solutions to issues/problems • Compare/contrast content-based functions and relationships	• Justify/defend opinions or explanations with evidence • Give content-based presentations using technical vocabulary • Sequence steps in grade-level problem-solving • Explain in detail results of inquiry (e.g., scientific experiments)	

The Can Do Descriptors work in conjunction with the WIDA Performance Definitions of the English language proficiency standards. The Performance Definitions use three criteria (1. linguistic complexity; 2. vocabulary usage; and 3. language control) to describe the increasing quality and quantity of students' language processing and use across the levels of language proficiency.

Can Do Descriptors: Grade Level Cluster 3-5

For the given level of English language proficiency and with visual, graphic, or interactive support through Level 4, English language learners can process or produce the **language** needed to:

	Level 1 Entering	Level 2 Beginning	Level 3 Developing	Level 4 Expanding	Level 5 Bridging	Level 6 - Reaching
READING	• Match icons or diagrams with words/concepts • Identify cognates from first language, as applicable • Make sound/symbol/word relations • Match illustrated words/ phrases in differing contexts (e.g., on the board, in a book)	• Identify facts and explicit messages from illustrated text • Find changes to root words in context • Identify elements of story grammar (e.g., characters, setting) • Follow visually supported written directions (e.g., "Draw a star in the sky.")	• Interpret information or data from charts and graphs • Identify main ideas and some details • Sequence events in stories or content-based processes • Use context clues and illustrations to determine meaning of words/phrases	• Classify features of various genres of text (e.g., "and they lived happily ever after"—fairy tales) • Match graphic organizers to different texts (e.g., compare/contrast with Venn diagram) • Find details that support main ideas • Differentiate between fact and opinion in narrative and expository text	• Summarize information from multiple related sources • Answer analytical questions about grade-level text • Identify, explain, and give examples of figures of speech • Draw conclusions from explicit and implicit text at or near grade level	
WRITING	• Label objects, pictures, or diagrams from word/phrase banks • Communicate ideas by drawing • Copy words, phrases, and short sentences • Answer oral questions with single words	• Make lists from labels or with peers • Complete/produce sentences from word/ phrase banks or walls • Fill in graphic organizers, charts, and tables • Make comparisons using real-life or visually-supported materials	• Produce simple expository or narrative text • String related sentences together • Compare/contrast content-based information • Describe events, people, processes, procedures	• Take notes using graphic organizers • Summarize content-based information • Author multiple forms of writing (e.g., expository, narrative, persuasive) from models • Explain strategies or use of information in solving problems	• Produce extended responses of original text approaching grade level • Apply content-based information to new contexts • Connect or integrate personal experiences with literature/content • Create grade-level stories or reports	

The Can Do Descriptors work in conjunction with the WIDA Performance Definitions of the English language proficiency standards. The Performance Definitions use three criteria (1. linguistic complexity; 2. vocabulary usage; and 3. language control) to describe the increasing quality and quantity of students' language processing and use across the levels of language proficiency.