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Mathematics Achievement and Native Language Within Dual Immersion Programs

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MATHEMATICS ACHIEVEMENT AND NATIVE LANGUAGE WITHIN DUAL IMMERSION PROGRAMS

by

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They did not conquer by their own strength and skill, but by Your mighty power and because

you smiled upon them and favored them.

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Abstract

This quantitative inferential study used ex post facto data that were previously acquired from Oregon school districts' hosting TWI/dual immersion students' mathematics achievement scores (SBAC), to determine if there was a statistical difference in math achievement between the two-native language (NES and NSS) students. The math SBAC data for academic school years 2016-17, 2017-18 and 2018-19 was disaggregated by native language (NES and NSS) and by grade levels 3, 4, and 5 see Tables seven, eight and nine. The statistical tools used were mean, population proportion, two-tailed t-test and two-tailed 2-sample z-test to compare sample proportion. This research concluded, the NES group of TWI/dual immersion students consistently outperformed the NSS group of TWI/dual immersion students. The findings revealed that the NES group of TWI/dual immersion students outperformed the NSS group of TWI/dual immersion students in all analyzed grades i.e. 3rd, 4^{th} and 5^{th}

Chapter 1

Seeds of the Research Idea

My 2019-2020 cohort of middle school mathematics students took an iReady Diagnostic as part of our preparation for Smarter Balanced Assessment Consortium (SBAC); iReady acts as a predictor for SBAC success. Table 1 offers a snapshot of the significant performance gap I observed in my native Spanish-speaking students (NSS) compared to their native English-speaking students (NES) peers.

Table 1

2019 iReady Math Diagnostic

Native Language	Exceeds	Meets	Nearly Meets
#NSS	2	5	16
%NSS	5%	12%	38%
#NES	7	11	1
%NES	17%	26%	2%
%NES & NSS	22%	38%	40%
Differences in % between NSS & NES	12%	14%	**36%**

Note. 42 students in the total cohort population. The data above demonstrate 60% of TWI students "Meeting" or "Exceeding." The disaggregated data also demonstrate a 36% difference with NSS not meeting the math grade level standards compared to the total TWI population.

My district shared these data with me and credited me with successfully teaching students mathematics. By combining the total number of Two-Way-Immersion (TWI) students who either "Met" or "Exceeded" on this test, the success rate was 60%. But a closer look at the

disaggregated data revealed what I perceive to be a devastating truth: within this cohort of TWI students, only 17% of NSS met or exceeded grade level standards. In fact, nearly 38% were failing. The NES students met or exceeded at a rate of 43%. This disparity set me on a quest to understand more and planted the seeds for this proposed dissertation study.

As I sought to understand whether this pattern is a result of my own perspective or personal bias, I began to research mathematics achievement data from the Oregon Department of Education, with a particular focus for Oregon data. All major student demographic information (including grades, race/ethnicity, total populations, socio economic status, disadvantaged, homeless, military-connected, ELLs, Indian education, migrant education, talented and gifted, extended assessment, students with disabilities and accommodations, gender, and binary vs. non-binary) is available. Despite the wealth of information I could access, this data search highlighted the lack of mathematics achievement scores data for TWI/Dual immersion student populations. While I can find achievement data for students who are enrolled in these programs, I cannot observe student achievement data as TWI/dual immersion students. The TWI/dual immersion students are lumped in with the total student population demographics. Therefore, the purpose of this study is to obtain, analyze, and better understand the mathematics achievement data for native Spanish speakers (NSS) and native English speakers (NES) who are enrolled within dual immersion programs in the state of Oregon.

Rationale of the Study

Research has shown that, as a group, Latino students consistently and systematically underperform academically within the United States (Darling-Hammond, 2010; Gándara & Contreras, 2009; Griffith, 2002; Howard, 2010). This historical academic underperformance is alarming, particularly given the rapid growth of Latino/Hispanic student populations within the

United States (Darling-Hammond, 2010; Guyll et al., 2010; Howard, 2010). This growth, paired with Spanish-speaking students' consistent underperformance compared to their English-speaking counterparts, poses an increasingly large achievement gap for an expanding percentage of the school population. According to the U.S. Census Bureau, Latino population growth has outpaced any other multicultural/non-white population in the United States over the past 20 years (Bauman, 2017). This expansion of the Spanish-speaking Latino population is evident from nursery school years through college age populations. Census Bureau studies indicate Latino student growth in first through eighth grade increased from 14.1% to 25.0% (Bauman, 2017), and college enrollment for Latino students in the US doubled, from 8.8 million to 17.9 million from 1996 to 2016. Latino students comprise 22.7% of student populations in the United States.

In order to serve this growing population of Spanish-speaking learners, one of the ways public-school systems have responded is to offer Two-way Immersion (TWI)/Dual Immersion language programs. The Center for Applied Linguistics (CAL), an accrediting body dedicated to promoting language proficiency and literacy for second language learners, has overwhelmingly adopted over 400 Dual/Immersion programs nationally, with over 70 active programs in Oregon (Center for Applied Linguistics, n.d.a).

These programs are committed to supporting bilingual, biliterate, and bicultural students, with the goal being "for students to develop high levels of language proficiency and literacy in both program languages, to demonstrate high levels of academic achievement, and to develop an appreciation for and an understanding of diverse cultures" (Center for Applied Linguistics, n.d. b). In investigating program outcomes, researchers have examined many of the more than 400 Dual Language programs throughout the United States and found multiple benefits for students learning in their first language and for developing a second language in the primary years.

Generally speaking, research indicates strong support for students' participation within TWI/Dual immersion programs. In research comparing TWI programs with mono-lingual traditional scholastic programs, it appears that TWI/Dual immersion programs are overall beneficial for all participating students.

Yet although it seems that dual immersion programs are successful in addressing native Spanish-speaking students' academic needs, upon closer inspection, anecdotal evidence suggests dual immersion programs may be failing the student populations they initially intended to serve. While established national data suggest participating TWI students academically outperform students within mono-lingual programs (Howard et al., 2003), emergent data within dual immersion cohorts suggest a prominent disparity between the academic performance of native Spanish-speaking students and native English-speaking students (Vega, 2016).

As a bilingual math teacher working in dual immersion programs for the last 12 years, this achievement disparity has become more obvious to me, personally, and I seek to understand whether it is accurate. Do native English speakers within dual immersion programs truly outperform dual immersion native Spanish speakers in mathematics achievement tests? My inquiry led me to explore state data from the Oregon Department of Education which offers student demographic data ranging from grade, race and ethnicity, socio economic status, disadvantaged, homeless, military-connected, ELLs, Indian education, migrant education, talented and gifted, extended assessments, students with disabilities and accommodations, to gender classifications such as binary and non-binary. I could not find data on dual immersion students, specifically whether dual immersion students are native Spanish speakers or native English speakers. While there are math achievement data for students who are in dual immersion

programs, there is no published categorical data disaggregating math scores for students by their first language.

Purpose of Study

This study will investigate whether differences exist in mathematics achievement test scores for native Spanish speakers (NSS) vs. native English speakers (NES) who are enrolled within dual immersion programs in Oregon. This research will subsequently explore the question, "Is there a difference between native English speakers' performance within dual immersion programs and native Spanish-speaking students in mathematics achievement tests?

Research Questions

Is there a difference between native English speakers' performance within dual immersion programs and native Spanish-speaking students in mathematics achievement tests?

1. How comparable are the two native language groups (3rd grade NES & 3rd grade NSS) within dual immersion programs in terms of their performance in the SBAC diagnostic tests in mathematics?
2. How comparable are the two native language groups (4th grade NES & 4th grade NSS) within dual immersion programs in terms of their performance in the SBAC diagnostic tests in mathematics?
3. How comparable are the two native language groups (5th grade NES & 5th grade NSS) within dual immersion programs in terms of their performance in the SBAC diagnostic tests in mathematics?

Significance of Study

The burgeoning Spanish-speaking Latino student population within the U.S., along with an increase in dual immersion programs designed to meet their needs, suggests the usefulness of

an investigation into disaggregated math achievement test scores for dual immersion students. This study confirmed data patterns of native Spanish-speaking students' academic underperformance within bilingual education settings. Additionally, the results of this study have potential to impact the constructs of current and future TWI/Dual immersion programs by making these math performance patterns plain.

Definition of Terms

Dual Language Immersion (DLI): In dual language education programs, students are taught literacy and academic content in English and a partner language. The goals of dual language are for students to develop high levels of language proficiency and literacy in both program languages, to demonstrate high levels of academic achievement, and to develop an appreciation for and an understanding of diverse cultures.

English Language Learners (ELL): A student whose first or home language is other than English and who enters school unable to participate effectively in instruction conducted exclusively in English.

*English Only (EO)**:*** often used to refer to students whose native language is English and who do not come from a home where another language is spoken.

*English Proficient (EP)**:*** often used interchangeably with English Only.

Language Majority: The language spoken by the larger in number of two groups constituting a whole. In this study, English is considered the language majority.

Language Minority: The language spoken by the smaller in number of two groups constituting a whole. In this study, Spanish is considered the language minority.

Limited English proficient student (LEP): Same as ELL. "LEP" is the term used in federal and most state law. Limited English proficient, student whose first or home language is other than

English and who enters school unable to participate effectively in instruction conducted exclusively in English. "LEP" is the designation used in federal and state laws.

Mono-Lingual (ML): Same as English only (EO)

Native English Speakers (NES): a person who learned to speak English as a child. Typically, this is the first language spoken in the home by parents/caretakers.

Native Spanish Speakers (NSS): a person who learned to speak Spanish as a child. Typically, this is the first language spoken in the home by parents/caretakers.

Native Speaker: a person who learned to speak the language of the place where he or she was born as a child rather than learning it as a foreign language. Typically, this is the first language spoken in the home by parents/caretakers.

Target language: The language other than English that is used for instruction. See partner language.

Two-Way Immersion (TWI): A dual language program in which both native English speakers and native speakers of the partner language are enrolled, with neither group making up more than two-thirds of the student population.

Limitations

The possible limitations to this study primarily rely on the effectiveness of data collection. The success of the data collection process greatly relies on Oregon school districts which host dual immersion programs and their willingness to release and share their data. Consequently, several limitations follow. First, the integrity of the data depends on dual immersion districts' fidelity in recording and capturing the students' native language. Second, the study will use existing secondary data. These secondary data have no assurance to the standardized environment during SBAC testing, for example time of testing, prior coaching, or

academic support with mathematics materials during testing. Another variable to consider is the sampling population limitations. The data will be limited to third grade students through fifth grade students for testing years from 2016-2017, 2017-2018 and 2018-2019. This data review will exclude traditional mono-lingual public school, private school, home school and charter schools by reviewing only public-school students within dual immersion programs.

Delimitations

The noted delimitations of this study begin with the use of data. I used all the data received from Oregon school districts participating within dual language programs. The study will only focus on elementary dual immersion students within the program from third grade to fifth grade. The Smarter Balance Summative Assessment begins at the elementary level at third grade and ends in fifth grade, therefore kindergarten through second grade students within dual language programs will be excluded. I only used data from testing school years 2016-2017, 2017-2018, and 2018-2019. This study purposely and specifically exclude data from the testing school years 2019-2020 and 2020- 2021 due to the negative impact the Covid-19 pandemic had on testing participation.

Summary

Vast research demonstrates that dual immersion programs are beneficial for all its participants. This research proposes that participants outperform their mono-lingual counterparts when comparing standardized testing in all subjects (Marian et al., 2013, p. 167). Yet a closer look at disaggregated data between NES and NSS within dual immersion programs has prompted a growing concern between dual immersion program teachers and administrators. Questions on whether the program is serving all its students are beginning to emerge.

This study will review the Oregon Smarter Balance Assessment data and look for mathematics achievement patterns between native English-speaking students (NES) and native Spanish-speaking (NSS) students, enrolled within dual immersion programs. If concrete and systematic patterns exist between the mathematics achievement of NES and NSS, program teachers and administrators may be able to address individual student needs and provide specific supports.

Chapter 2

Literature Review

The literature review for this study focuses on three main themes. The first theme introduced is a brief history of dual immersion programs. The history of dual immersion programs highlight how dual immersion programs are conceptualized and operationalized. The second portion presents research exploring the benefits of dual immersion programs, and the final portion explores research on the relationships between mathematics achievement and student demographics. All three elements contribute to this study's significance and efforts to address the gap in public statistical and categorical achievement data for Oregon dual immersion programs.

Conceptualization and History of Dual Immersion Programs

The dual immersion initiative began in the early 1960's as a response to an influx of Spanish-speaking students entering the U.S. public school systems. The first documented dual immersion program within the U.S. was in Dade County, Florida in 1963. These programs were originally designed to serve Cuban citizens seeking refuge in Florida from Castro's regime. These Cuban families intended to return to Cuban schools and therefore sought to maintain their native language. Soon after in 1967, the Bilingual Education Act (BEA)/Title VII was passed. This legislation

> …defined a bilingual education program as one that provided instruction in English and in the native language of the student to allow the student to progress effectively through the educational system. English as a second language (ESL) programs alone were considered insufficient (Stewner-Manzanares, 1988, p. 3).

The BEA/Title VII was the first known bilingual legislation which determined and recognized the need for supporting students with limited English-speaking ability. Mainly, BEA/Title VII supported local schools by providing federal funds to initiate and maintain bilingual programs. This movement was also a political strategy supported by community members and local politicians as an extension of the Civil Rights Movement.

Bilingual education's funding laws contained six *titles* which funded 90% of the nation's schools. Initially, guidelines and funding were under Title I; specific funding for library materials fell under Title II; funding for *at risk* students was provided under Title III, which included counseling and funding for foreign language programs; university research on education was funded under Title IV, state departments of education were funded under Title V and Title VI provided general law provisions for both elementary and secondary education under the Elementary and Secondary Education Act of 1965 (ESEA). Since 1965 these guidelines, provisions and laws have been revised several times to accommodate the current need or political agendas. Table 2 details key dates related to the Elementary and Secondary Education Act of 1965 and bilingualism.

Table 2

Important Dates in Bilingual Education History

Event	Public Law	Date Passed	Purpose
Elementary and Secondary Education Act (ESEA)	89-10	1965	ESEA originally provided legal authority for the U.S. government's financial support of K-12 education, setting funding limits and establishing legal requirements for state and local education agencies, universities, Native American tribes, and other entities receiving federal assistance through programs such as Title I.

Elementary and Secondary Educational Act Amendments of 1969	91-230	1969	These amendments to ESEA authorized comprehensive planning and evaluation grants to state education agencies (SEAs) and local education agencies (LEAs) and established a National Commission of School Finance.
Bilingual Education Act (BEA)	90-247 93-380 95-561 98-511 100-297 103-382	1968 1974 1978 1984 1988 1994	Added Title VII, BEA, which provided discretionary, supplemental funding (federal aid) for school districts that established programs to meet the special educational needs of children with limited English-speaking ability. The 1978 amendment to the act (PL 95-561) provided a transition to English-speaking classes. BEA also was amended in 1974 (PL 93-380), 1984 (PL 98-511), 1988 (PL 100-297), 1994 (PL 103- 382), and 2001 as part of No Child Left Behind (NCLB).
Lau v. Nichols	414 U.S. 563	1974	Ruling on Limited English Proficient education, in Lau v. Nichols the Supreme Court ruled that school districts must provide remedies for non-English-speaking children for meaningful education. (Identical is not equal.)
Department of Education Organization Act	96-88	1979	Signed by President Carter, established the cabinet level department known as the Department of Education.
Educational Consolidation and Improvement Act (ECIA)	97-35	1981	ESEA consolidated and simplified the administration of Federal elementary and secondary education programs to eliminate unnecessary paperwork and undue Federal interference in our nation's schools.
Goals 2000: Educate America Act (EAA)	103-227	1994	EAA added two goals to the National Educational Goals—increased parental involvement and professional development for teachers. Also provided support to states to develop standards and assessments.
Improving America's Schools Act (ISEA)	103-382	1994	Through ISEA, Title I was revised to require all students (including economically disadvantaged) be assessed against the same standards, which states were developing with support from Goals 2000; schools with low performance were to be

			identified and provided extra assistance as schools "in need of improvement."
No Child Left Behind Act (NCLB)	107-110	2001	NCLB requires that all students be "proficient" (determined by individual state Department of Education) in reading, mathematics, and science by 2014, with Adequate Yearly Progress (AYP) measures to determine school success; annual standardized tests (developed by the states) in grades 3-8 in reading and mathematics; reports from all schools by disaggregated groups of students; sanctions on schools not meeting AYP requirements; plans to close achievement gaps.
English Language Acquisition Act (ELAA)	107-110	2001	Sections 3101 and 3102 of NCLB constitute the ELAA, which replaces the Bilingual Education Act and requires that LEP students be tested in English after three years in the U.S. This act also changed the name of the US Department of Education Office of Bilingual Education and Minority Language Affairs to Office of English Language Acquisition, Language Enhancement, and Academic Achievement for Limited English-Proficient Students (OELA).

Source: Office of English Language Acquisition, Language Enhancement, and Academic Achievement for Limited English-Proficient Students (OELA), retrieved from https://www2.ed.gov/about/offices/list/oela/index.html.

ESEA was reviewed and amended in 1968 which added Title VII, the Bilingual Education Act (BEA), meant to educate limited English proficient children and youth to meet the same rigorous standards for academic performance expected of all children and youth, including meeting challenging State contents standards and challenging State student performance standards in academic areas by developing systemic improvement and reform of educational programs serving limited English proficient students through the development and implementation of exemplary bilingual education programs and special alternative instruction programs…(Bilingual Educational Act, 1968).

Title VII focused on immigrant students with limited English-proficiency (LEP). It ensured support of LEP students to attain English language proficiency as well as help them meet the same rigorous achievement standards that all students are expected to meet. A class action suit was filed in 1971 in the Supreme Court for equal education opportunities for K-12 language learners known as Lau vs. Nichols. In San Francisco, California, half of the 2,800 LEP Chinese students within the school system received additional language support while the other half did not. The U.S. Supreme Court decision stated, "When children arrive in school with little or no English-speaking ability, 'sink or swim' instruction is a violation of their civil rights" (Lau vs Nichols, 1974, p. 1).

In 1981 during the Reagan Administration, the Education Consolidation and Improvement Act (ECIA) was passed. Title I reduced federal regulations and placed the states and local jurisdiction in control of resources, ultimately cutting federal aid to schools. In 1994, the revision of ESEA was curated by Improving America's Schools Act (IASA). IASA was meant to coordinate federal resources and policies with the state's current plans for instruction for all students. The reform prompted three significant changes to Title I:

> (1) adding math and reading/language arts standards to be used to assess student progress and provide accountability; (2) reducing the threshold for schools to implement school wide programs from 75% poverty to 50%; and (3) increasing the opportunity to use federal funding from multiple programs to dispense funds at a school wide level (Stevenson, 2014, p. 4).

In 2002, during the Bush administration, the BEA/Title VII was repealed and replaced with No Child Left Behind (NCLB) and Title VII was reclassified as Title III (English Language Acquisition, Language Enhancement, and Academic Achievement Act). This change dramatically affected the student population served by the BEA and its associated funding. The

grant process moved from directly funding schools to a formula grant program based on the total number (per capita basis) of limited-English-proficient and immigrant students within a school (*NABE*, 2011). With the inception of NCLB, Crawford (2002) stated, "Title VII of the Elementary and Secondary Education Act, which transformed the way language minority children are taught in the United States - promoting equal access to the curriculum, training a generation of educators, and fostering achievement among students- expired quietly on Jan. 8, 2002" (p. 124).

NCLB legislation changed Title VII's priority to educate ELL students in their native language to one that prioritized native Spanish-speaking students' fluency in English. Accountability provisions, by NCLB such as judging schools by the percentage of ELLs reclassified as fluent in English each year and how they were tested, discourage native-language instruction. NCLB mandates yearly English assessments, and annual measurable achievements objectives and schools who fail to demonstrate achievement are sanctioned (Crawford, 2002).

Title III prioritized bilingual, biliteracy and bicultural education for all students: "[B]ilingualism is emerging as a strategy for improving the academic achievement of all students. Two-way bilingual or dual-language programs integrate language-minority and language-majority students for instruction in two languages" (Calderon & Carreon, 2000, p. 6). Adding native English speakers to dual immersion programs was a response to globalization, which made bilingualism attractive to parents of native English speakers. These changes are reflected in today's dual immersion programs. Student population in these programs is usually 50% native Spanish speakers and 50% native English speakers; when demand exceeds capacity, lotteries decide students' acceptance status. It is challenging for students to enter dual immersion programs after kindergarten since they do not have the same language proficiency levels in

Spanish or English, so "interested parents sign a "memorandum of understanding" when they register their child, which emphasizes a long-term commitment to the program" (De Jong, n.d., p. 68).

Teachers who are typically recruited to teach within dual immersion programs must be highly qualified teachers with nearly native language skills in both English and the partner language (in most cases, Spanish). The TWI/dual immersion teacher population is generally identified as Hispanic/Latino/a or White. The racial diversity between staff and students varies; in most cases, diversity between student and teacher populations is out of balance: teachers are predominantly White while the student population is predominantly Hispanic/Latino. As an example, one dual immersion district that is included in this study reports 86.8% of their licensed teachers identify as White and 7.7% of teachers identify as Hispanic/Latino/a. The district's student population reports 53.8% White and 28.1% as Hispanic/Latino/a. The White teacher to White student ratio is 62%, compared to the Hispanic/Latino/a teacher to Hispanic/Latino/a student ratio, which is 27%. These statistics indicate that even within programs designed to serve LatinX students, representation is less than ideal.

Operationalization of Dual Immersion

Dual immersion programs typically operate in one of four standard formats: Developmental Dual Immersion (DDI), Two-way Immersion (TWI), Foreign Language Immersion (FLI) and Heritage Language Programs (HLP). Programs' student populations typically dictate the type of program school districts choose (see Table 3 below). The DDI program is a bilingual program that focuses on maintenance of native speakers' partner language. The TWI program typically enrolls students of the language minority and language majority with a balanced focus on both languages. The FLI program is a one-way immersion that focuses on

second language acquisition and primarily enrolls native English speakers. Finally, HLPs enroll students who are dominant in English but have ancestral roots in a partner language.

Table 3

Types of Dual Immersion Programs for Language Acquisition

Developmental	Two-way/Dual immersion	Foreign Language Immersion	Heritage Language
Maintenance, bilingual programs enrolled students who are native speakers of the partner language.	Immersion programs enroll a balance of native English speakers and native speakers of the partner language.	Language immersion or one-way immersion enroll native English-speakers.	Enroll students who are dominant in English, but heritage/ancestors spoke the partner language.
L1 Acquisition	Bilingual Acquisition, La & Lb or BFLA	Second/Foreign Language LearningL2/SL/FL	Second Language Learning

(McCarty, 2013)

Beginning a Dual Immersion Program

Dual language programs are voluntary programs initiated by a school districts' community, which include parents, teachers, administrators, and local political figures. If a school district decides to implement a dual immersion program, they often begin with guidelines for dual language programs such as the "Guiding Principles of Dual Language Education," laid out by the Center for Applied Linguistics (CAL). CAL offers seven organizational guiding principles for dual language education. These principles guide program structure, curriculum, instruction, assessment and accountability, staff quality and professional development, family

and community involvement, and support/resources. According to a local Title III administrator, there is no official approval process required for districts to implement a dual immersion program, but in Oregon, districts share their TWI program designs in their English Language Development (ELD) plans, which must be submitted to the Oregon Department of Education every two years.

Districts who choose to start dual immersion programs typically begin roll out for kindergarten-aged students. Programs grow as the cohort of students graduate into the next school year with the goal of cycling students through to high school. Attrition within dual immersion programs is most evident in high school due to class availability, and student choice. Therefore, students sometimes have the opportunity to graduate high school with an official state Seal of Biliteracy or may exit the program anytime.

Dual immersion school districts highly favor Oregon's official Seal of Biliteracy as it helps to legitimize success at various levels, for districts, programs, and students "[t]he State School Board created the Oregon State Seal of Biliteracy (OSSB) to recognize and value the native language/s students speak and bring to their English academic studies, to value language programs in schools, and to encourage students in the study of languages (Biliteracy Initiatives n.d.).

Research on the Benefits of Dual Immersion

There is a vast amount of research on dual immersion programs and their benefits. According to Thomas and Collier (2012), learning two or more languages stimulates certain brain areas responsible for "creativity, problem solving abilities, and interpersonal emotional aptitude in bilingual individuals" (p. 164). Further, Genesee and Lindhold-Leary's (2010) research suggests that for English Learners,

> …immersion helps close the achievement gap. English Learners have a higher rate of success in Immersion Education versus English mainstream. This is because students have maximum access to the curriculum and the opportunity to develop literacy and academic skills in both their native language and English in a culturally-validating setting. (p. 331)

Researchers such as Cummins (1986) and Ager (2005) emphasize how immersion programs promote multicultural awareness, which in turn raises students' self-esteem by promoting their community's language alongside English. Dual Language students tend to stay in school (Krashen, 1996), take pride in their identity (Krashen, 1999; Tomlinson & Masuhara, 2010), and demonstrate fewer behavioral issues compared to students in English-only settings (Krashen, 1996). Additionally, in a meta-analysis done by the National Literacy Panel, Goldenberg (2008) reported they found:

> Teaching English Learners to read in their first language and then in their second language, or in their first and second languages simultaneously (at different times of the day), compared with teaching them to read in their second language only, boosts their reading achievement in the second language (National Literacy Panel, 2000, p. 14).

Krashen (1997) continues, as he agrees with the research data on the benefits of bilingual education. He advocates for bilingual education and determines:

> The best bilingual education programs include all of these characteristics: ESL instruction, sheltered subject matter teaching, and instruction in the first language. Non-English-speaking children initially receive core instruction in the primary language along with ESL instruction. As children grow more proficient in English, they learn subjects using more contextualized language (e.g., math and science) in sheltered classes taught in

English, and eventually in mainstream classes. In this way, the sheltered classes function as a bridge between instruction in the first language and in the mainstream. (p. 2)

Other beneficial facets of bilingual education are reported by studies done on parent responses to bilingual education. Whiting and Feinauer (2011) found six benefits shared by parents of students within bilingual/dual immersion programs. The study focused on why parents choose to enroll their students within dual immersion. The study concluded that parents associated six benefits of participating within a TWI/dual immersion program. These benefits included biliteracy, future career opportunities, increased career opportunities, variety of educational experience, diversity awareness, and retained heritage. Whiting and Feinauer (2011) quoted parents' responses as they further expressed their reasons for enrolling their children within TWI/dual immersion programs as:

> some parents even talked about the process of learning language as a reason for enrollment, as in it is 'academically challenging to study two languages' or 'research showing bilingual people as more flexible thinkers.' These response show that parents connect bilingualism itself with good educational opportunities and experiences. (p. 643).

Whiting and Feinauer (2011) highlight the difference in the collected response rate from Spanish to English speaking parents. They found no statistical significance in parent responses. They continue by explaining how responses from Spanish speaking parents to English speaking parents was "minimal," from "81% to 77%" noting that most parents shared the same views on the importance of their children's bilingual education.

Historically, research suggests these benefits exist for both native Spanish-speaking students and native English-speaking students. However, there is a need for additional research to confirm academic discrepancies. Research from Vega (2016) addresses this need:

> Our study confirmed the relative success of two-way immersion programs educating Latino students and highlighted the urgent need to conduct more research in bilingual settings… [t]he fact that [Spanish-speaking] Latino students were still lagging behind their native English-speaking counterparts in the TWI program is a reality that must be researched further…. (p.1)

It is important to study the patterns within math achievement test scores for both NES and NSS within dual immersion programs in order to better understand the existence and extent of NSS underperformance.

Relationship Between Student Demographics and Mathematics Achievement

My review of the literature reveals that researchers seem to indicate that dual immersion students outperform their mono-lingual mainstream peers in mathematics. Alanís (2000) writes, "… findings indicate that the majority of students who participated in the two-way bilingual program were performing at academic levels equal to or greater than their non-participant campus peers when tested on the Texas Assessment of Academic Skills (TAAS)" (p. 225). The bulk of bilingual education studies seem to agree with Alanís in that bilingual education outperforms monolingual education.

A study by Marian et al. (2013) reviewed the effects of bilingual education on both reading and math achievement. The study compared test scores of several elementary school programs and found benefits for both minority-language students and majority-language students. In fact, this study established that minority-language students within dual programs

outperformed their peers in other similar programs like the Transitional Program of Instruction. This study also concluded that the majority-language students in dual programs outperformed their peers in Mainstream monolingual classrooms. Ultimately the findings by Marian et al, (2013) favored bilingual two-way immersion programs as a way of enhancing both reading and math skills for both language populations. (Marian et al., 2013, p. 167)

The interesting thing about this study is that they compare DL native English speakers with monolingual mainstream students and compare DL native Spanish speakers to their English Language Learners peers in Transitional Programs of Instruction. The study does not compare achievement levels for NES and NSS mathematics achievement within the DL program.

Further, in a study designed for both languages to demonstrate academic achievement by grade level (De Jong, n.d., p. 76) both NES and NSS math scores were compared to National Curve Equivalency scores (NCE). The study concluded that both student groups met the desired standards. The native English-speaking students scored above the 50th NCE in both reading and mathematics and the Spanish-speaking students scored above the standard in English mathematics (De Jong, n.d., para. 76). Yet although the study confirmed both groups were successful in meeting the desired standards, it did not compare scores between the two target groups. The data shared within the study suggest NSS scores lag behind those of NES.

Another study done to investigate math achievement within dual immersion programs looked at third and fourth grade dual language immersion students "who receive content instruction predominantly in the target language." The study compared the math achievement of third grade dual language immersion students with the same levels of English Language Arts (ELA) achievement to (NDLI) non-dual language immersion students. The study found that the dual language immersion students with the same levels of achievement in ELA as their non-dual

language immersion students scored at the same math achievement levels. Watzinge-Tharp. J., et al. (2018) also compared the mathematics achievement scores of fourth grade students within dual immersion to non-dual language students without taking ELA scores into consideration for comparison. The study observed three target languages within two language program types. They found the typical dual language student in fourth grade had greater gains in mathematics when compared to the typical non-dual language fourth grade student (pp. 925). In both cases the DLI students demonstrated higher math achievement when compared to non-DLI students. This particular study focused on comparing math achievement of DLI students and non-DLI students with comparable ELA scores. The study also compared DLI math achievement to non-DLI students without looking at ELA scores. In both cases the DLI students outperformed the non-DLI students.

A study conducted by Herrera (2020) evaluated the academic math performance on the New York State Standardized Math Assessments (NYS) of third grade English Language Learners (ELLs) within dual language classes against two distinct groups. The study compared the ELL within dual immersion to mono-lingual, English only, third grade students and bilingual dual immersion students. Herrera's (2020) study highlights the importance of dual language programs for English language learners through the study's findings and concluded that the ELL students within dual immersion programs scored significantly higher in both English language arts and mathematics when compared to their mono-lingual counterparts (p. 8).

The majority of the research found on mathematics achievement within dual immersion programs agree on the success of bilingually instructed students. These studies conclude that dual immersion students routinely score higher than the students in English only math classes (Genesee et al., 2009). Particularly to Oregon, Martinez (2014) indicated mathematics outcomes

for dual immersion programs seem positive and correlates the higher success in passing the high school exit exams to TWI students' higher mathematics achievement. This success, Martinez (2014) continues to explain, is attributed to TWI students scoring higher than non-TWI students and therefore enrolling in higher level math courses.

ODE offers meticulously detailed demographic and math achievement scores data, which include participation rates and performance percentages for various grade levels and student groups . (*Assessment Group Reports*, n.d., Mathematics section). Table 4 contains a simplified version of Oregon students' mathematics SBAC scores for the 2016-2017 academic year.

Table 4

Oregon Department of Education (ODE) SBAC scores for 2016-2017

Subject	Student Group	Grade Level	Percent Proficient (Level 3 or 4)	Percent Level 4	Percent Level 3	Percent Level 2	Percent Level 1	Participation Rate
Mathematics	Asian	Grade 3	69.4	44.2	25.2	16.5	14.1	97.7
Mathematics	Asian	Grade 4	68.5	40.3	28.2	20.3	11.2	98.2
Mathematics	Asian	Grade 5	61.1	43.1	18.0	21.1	17.8	97.5
Mathematics	Black/African American	Grade 3	22.0	7.0	15.0	25.3	52.7	92.7
Mathematics	Black/African American	Grade 4	19.7	5.1	14.6	29.1	51.1	94.1
Mathematics	Black/African American	Grade 5	16.2	6.8	9.4	24.2	59.6	94.2
Mathematics	Econo. Disadvantaged	Grade 3	34.1	10.5	23.5	27.2	38.7	95.9
Mathematics	Econo. Disadvantaged	Grade 4	31.2	9.3	21.9	35.5	33.4	96.2
Mathematics	Econo. Disadvantaged	Grade 5	26.6	11.4	15.2	29.9	43.6	95.8
Mathematics	Extended Assessment	Grade 3	46.7	8.0	38.7	23.2	30.2	100.0
Mathematics	Extended Assessment	Grade 4	35.1	8.8	26.3	35.8	29.1	100.0

Mathematics	Extended Assessment	Grade 5	39.7	6.5	33.2	34.1	26.2	100.0
Mathematics	Female	Grade 3	45.0	17.8	27.2	25.3	29.6	96.1
Mathematics	Female	Grade 4	42.1	15.8	26.2	33.0	24.9	95.9
Mathematics	Female	Grade 5	37.6	19.4	18.1	29.2	33.2	95.4
Mathematics	Hispanic/Latino	Grade 3	27.7	7.8	19.9	27.9	44.4	97.4
Mathematics	Hispanic/Latino	Grade 4	25.5	7.1	18.5	35.2	39.3	97.3
Mathematics	Hispanic/Latino	Grade 5	21.9	8.8	13.1	29.1	49.0	97.4
Mathematics	American Indian/Alaskan Native	Grade 3	29.7	7.8	21.8	28.4	42.0	95.2
Mathematics	American Indian/Alaskan Native	Grade 4	25.2	7.5	17.7	35.2	39.6	95.2
Mathematics	American Indian/Alaskan Native	Grade 5	21.5	8.6	12.9	27.7	50.8	94.8
Mathematics	Indian Education	Grade 3	34.2	11.1	23.1	27.8	38.0	94.9
Mathematics	Indian Education	Grade 4	22.9	6.1	16.7	38.0	39.2	95.1
Mathematics	Indian Education	Grade 5	24.4	11.4	13.0	30.1	45.6	95.5
Mathematics	English Learners	Grade 3	19.2	4.1	15.1	27.3	53.5	97.9
Mathematics	English Learners	Grade 4	15.3	2.7	12.6	34.2	50.5	98.4
Mathematics	English Learners	Grade 5	9.3	2.2	7.1	25.3	65.4	98.2
Mathematics	Male	Grade 3	46.5	20.5	26.0	24.2	29.3	95.1
Mathematics	Male	Grade 4	44.4	18.9	25.5	30.5	25.0	95.5
Mathematics	Male	Grade 5	40.3	22.2	18.1	27.0	32.7	95.1
Mathematics	Migrant Education	Grade 3	19.9	4.2	15.7	29.7	50.4	98.8
Mathematics	Migrant Education	Grade 4	19.3	3.8	15.5	35.1	45.6	98.7
Mathematics	Migrant Education	Grade 5	17.9	5.6	12.4	28.1	53.9	98.4
Mathematics	Multi-Racial	Grade 3	51.2	22.8	28.4	23.8	25.0	95.0

Mathematics	Multi-Racial	Grade 4	44.1	18.9	25.2	31.7	24.2	95.8
Mathematics	Multi-Racial	Grade 5	43.5	24.8	18.8	27.1	29.3	95.0
Mathematics	Pacific Islander	Grade 3	25.4	7.0	18.4	29.8	44.7	97.8
Mathematics	Pacific Islander	Grade 4	28.1	8.0	20.1	34.8	37.1	98.4
Mathematics	Pacific Islander	Grade 5	23.1	9.2	13.8	24.9	52.0	96.8
Mathematics	SWD with Accommodations	Grade 3	9.0	1.6	7.4	14.9	76.1	100.0
Mathematics	SWD with Accommodations	Grade 4	6.4	0.9	5.4	21.4	72.3	100.0
Mathematics	SWD with Accommodations	Grade 5	5.2	1.5	3.6	14.1	80.8	100.0
Mathematics	Students with Disabilities (SWD)	Grade 3	20.9	7.9	13.0	23.4	55.7	89.1
Mathematics	Students with Disabilities (SWD)	Grade 4	18.2	6.2	12.0	28.2	53.6	90.0
Mathematics	Students with Disabilities (SWD)	Grade 5	12.9	6.3	6.6	23.2	63.8	89.9
Mathematics	Talented and Gifted (TAG)	Grade 3	> 95.0%	-	-	-	-	-
Mathematics	Talented and Gifted (TAG)	Grade 4	> 95.0%	-	-	-	-	-
Mathematics	Talented and Gifted (TAG)	Grade 5	93.8	84.0	9.9	4.7	1.4	96.9
Mathematics	Total Population (All Students)	Grade 3	45.8	19.2	26.6	24.7	29.5	95.6
Mathematics	Total Population (All Students)	Grade 4	43.3	17.4	25.9	31.7	25.0	95.7
Mathematics	Total Population (All Students)	Grade 5	39.0	20.8	18.1	28.1	33.0	95.2
Mathematics	White	Grade 3	52.3	22.6	29.8	23.9	23.7	94.9
Mathematics	White	Grade 4	50.0	20.7	29.3	31.1	18.9	94.9
Mathematics	White	Grade 5	45.3	24.7	20.5	28.4	26.3	94.3

This table supports analysis of demographic characteristics pertaining to mathematics performance. For example, the data demonstrate 69.4% of third-grade Asian students achieved

proficiency in mathematics on the SBAC. In contrast, African American students achieved proficiency at a 22% rate. These data support an understanding of the proficiency levels for various learning groups, such as TAG students against the Total population by grade level, or migrant groups against the Total population. Yet despite this granularity, this data set fails to highlight performance for dual immersion students, disaggregated by native language. Given the growth rate of this student population and the growing, albeit anecdotal, concern that dual language teachers have about NSS performance compared to their NES peers, further study is warranted.

The literature review for this study focused on three main themes. The first theme reviewed the history of dual immersion programs which included the conceptualization and operationalization of dual immersion programs within the United states. The second portion reviewed the research on the benefits of dual immersion programs, and the final portion explored research on the relationships between mathematics achievement and student demographics. All three themes contributed to the study's significance. This literature research review addressed the gap in public statistical and categorical mathematics achievement data for Oregon dual immersion programs, specifically addressing the target groups NES students and NSS students.

Chapter 3

Methodology

A. INTRODUCTION

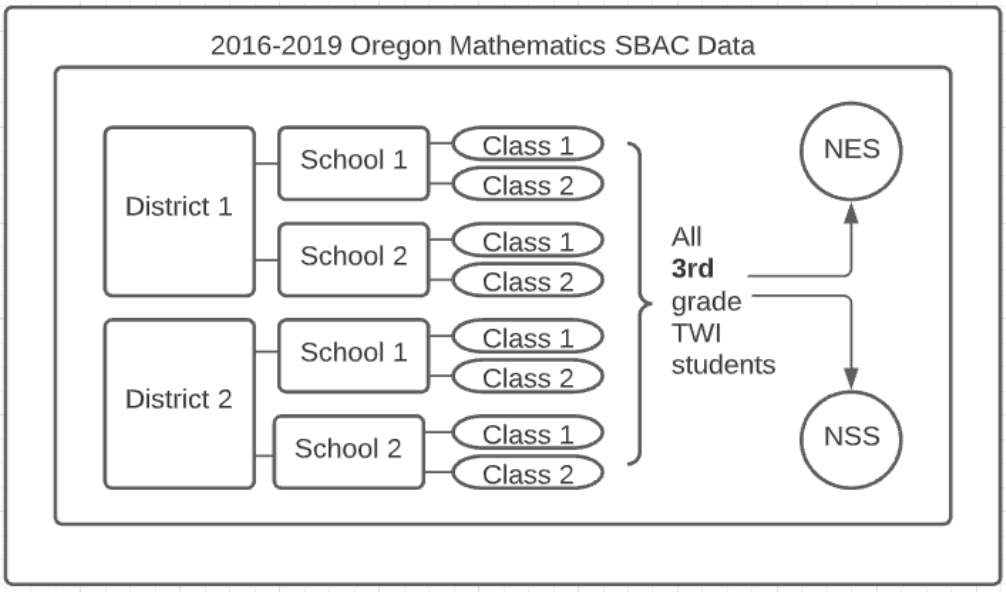
In this study, the differences in the Smarter Balance Assessment Consortium scores (SBAC) for mathematics academic achievement were measured between two samples representing two populations to see if there was a difference in the scores of the population from which the samples came. The two populations from which the samples were drawn were the native English speakers (NES) and native Spanish speakers (NSS) who participate within dual immersion programs in the state of Oregon. The mean score of a sample from each of the two native language subgroups were compared to determine if there was a difference in the mean score from which the samples came. The differences between population proportions were also examined by looking at the proportion of each sample of dual immersion students who passed the SBAC test.

Both, the mean scores of the SBAC test and population proportions of the students who passed the test were compared by grade level for school years 2016 to 2019. The third grade NES students from the academic school years 2016 to 2019 were compared to the third grade NSS students from the academic school years 2016 to 2019. Similarly, the fourth grade NES students from the academic school years 2016 to 2019 were compared to the fourth grade NSS students from the academic school years 2016 to 2019. Finally, the fifth grade NES students from the academic school years 2016 to 2019 were compared to the fifth grade NSS students from the academic school years 2016 to 2019. The data were taken from two metro Portland area public school districts. Each represented school district hosts two dual immersion schools and each school hosts two classes per grade. The data from 2016 to 2019 for both districts were

compiled per grade level and then disaggregated by NES and NSS. School District 1 (see figures 1-3) serves part of the suburban Portland Metro area in Oregon which include four cities and two unincorporated communities. District 1 has recorded 12,326 students enrolled through two high schools, three middle schools, 10 elementary schools and two alternative schools. District 2 (see figures 1-3) has recorded 4,970 enrolled students and serves two suburban Portland Metro area cities. District 2 has one high school, two middle schools, six elementary schools and three unincorporated areas. Each represented school district hosts two dual immersion schools and each school hosts two classes per grade. The data from 2016 to 2019 for both districts were compiled per grade level and then disaggregated by NES and NSS. The below Figures 1-3 illustrate the data's workflow.

Figure 1

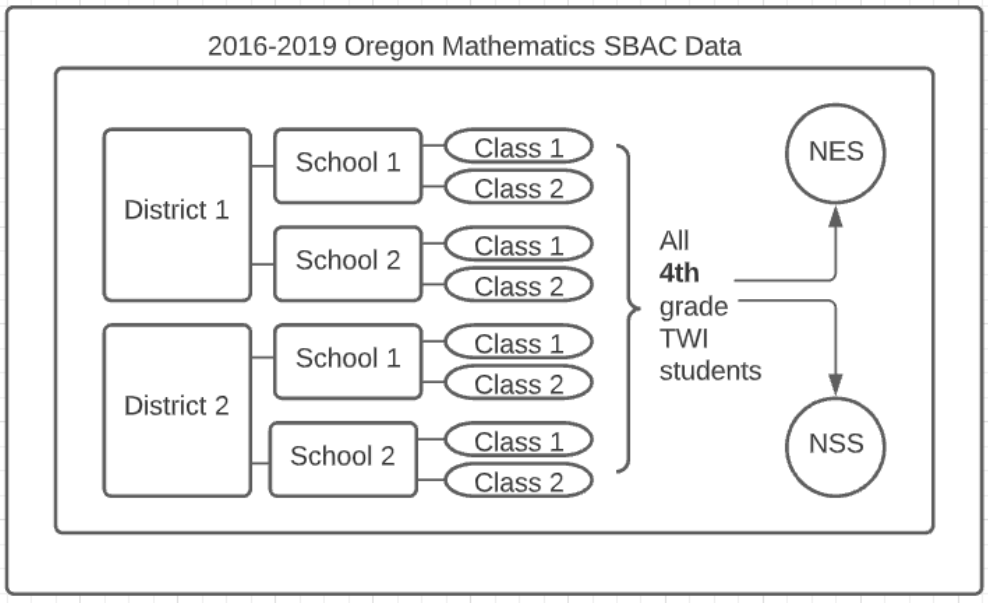
SBAC Data workflow for 3rd grade



Note. District 1 and district 2 mathematics' SBAC 3rd grade scores are compiled and then disaggregated by subgroups NES and NSS.

Figure 2

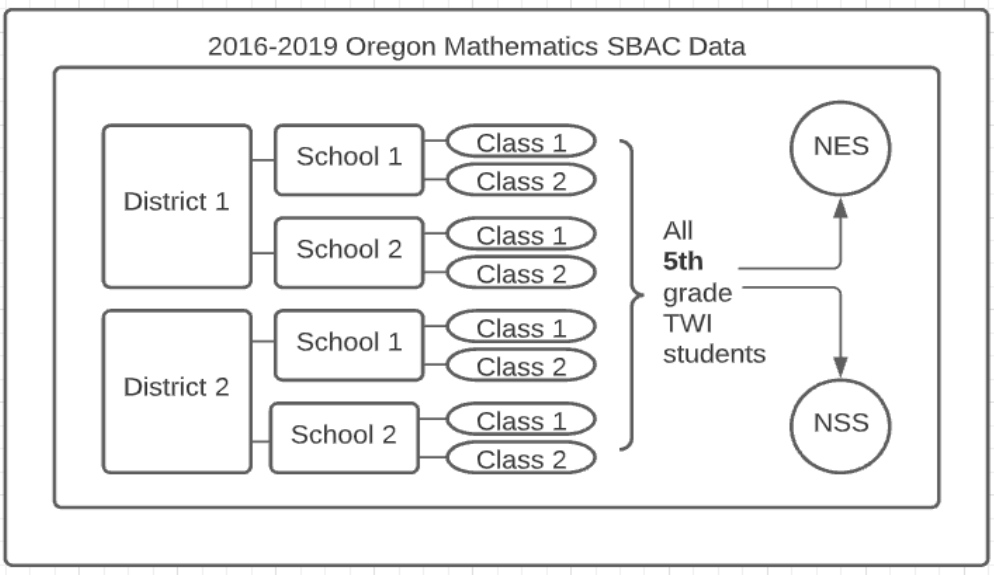
SBAC Data workflow for 4th grade



Note. District 1 and district 2 mathematics' SBAC 4th grade scores are compiled and then disaggregated by subgroups NES and NSS.

Figure 3

SBAC Data workflow for 5th grade



Note. District 1 and district 2 mathematics' SBAC 5th grade scores are compiled and then disaggregated by subgroups NES and NSS.

B. PURPOSE OF THE STUDY

The purpose of this study is to obtain, analyze, and better understand the mathematics achievement data for native Spanish speakers (NSS) and native English speakers (NES) who are enrolled within dual immersion programs in the state of Oregon. This quantitative inferential ex post facto study will use previously acquired data from the Oregon school district's hosting TWI/dual immersion students' mathematics achievement scores (SBAC), to determine if there is a statistical difference in math achievement between NES and NSS within TWI/Dual immersion programs when testing data are disaggregated by native language?

C. RESEARCH QUESTIONS AND HYPOTHESES

Research Question: Is there a difference between native English speakers' mathematical performance and native Spanish speakers' mathematical performance within the dual immersion program in grades 3 to 5 in the state of Oregon?

1. How comparable are the two native language groups (3rd grade NES & 3rd grade NSS) within dual immersion programs in terms of their performance in the SBAC diagnostic tests in mathematics?
2. How comparable are the two native language groups (4th grade NES & 4th grade NSS) within dual immersion programs in terms of their performance in the SBAC diagnostic tests in mathematics?
3. How comparable are the two native language groups (5th grade NES & 5th grade NSS) within dual immersion programs in terms of their performance in the SBAC diagnostic tests in mathematics?

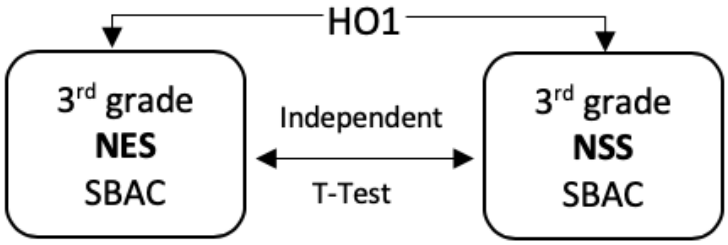
Hypotheses

HO1: There is no difference in the mean math SBAC score of 3rd grade NES and the mean math 3rd-grade SBAC score of the NSS in the dual immersion program.

HA1: There is a difference in the mean math SBAC score of 3rd grade NES and the mean math 3rd grade SBAC score of the NSS in the dual immersion program.

Figure 4

Illustrates the independent T-Test between 3rd grade NES and NSS.



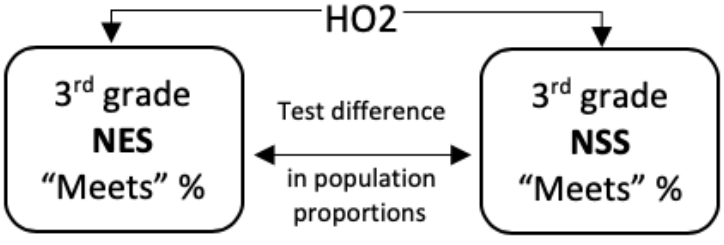
Note. In order to test this Null Hypothesis HO1; A two independent samples T-test was used to determine if there is a significant difference. See Figure 4

HO2: There is no difference in the percentage of the NES 3rd grade students who passed and the percentage of the NSS 3rd grade students who passed in the dual immersion program.

HA2: There is a difference in the percentage of the NES 3rd grade students who passed and the percentage of the NSS 3rd grade students who passed in the dual immersion program.

Figure 5

Illustrates the independent sample Z-Test between 3rd grade NES and NSS.



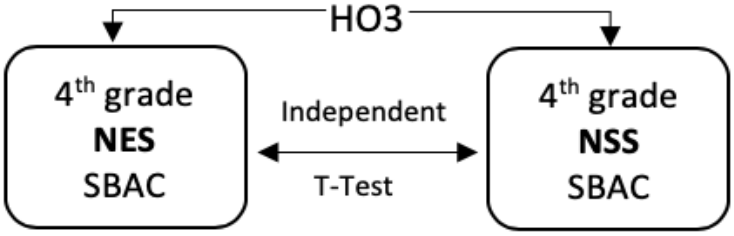
Note. In order to test this Null Hypothesis HO2; A two independent sample z-test for differences in population proportion was conducted for each passed/ "Meets" group. See Figure 5

HO3: There is no difference in the mean math SBAC score of 4th grade NES and the mean math 4th grade SBAC score of the NSS in the dual immersion program.

HA3: There is a difference in the mean math SBAC score of 4th grade NES and the mean math 4th grade SBAC score of the NSS in the dual immersion program.

Figure 6

Illustrates the independent T-Test between 4th grade NES and NSS.



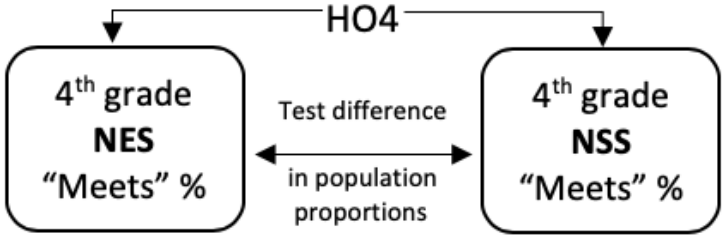
Note. In order to test this Null Hypothesis HO3; A two independent samples T-test was used to determine if there is a significant difference. See Figure 6

HO4: There is no difference in the percentage of the NES 4th grade students who passed and the percentage of the NSS 4th grade students who passed in the dual immersion program.

HA4: There is a difference in the percentage of the NES 4th grade students who passed and the percentage of the NSS 4th grade students who passed in the dual immersion program.

Figure 7

Illustrates the independent sample Z-Test between 4th grade NES and NSS.



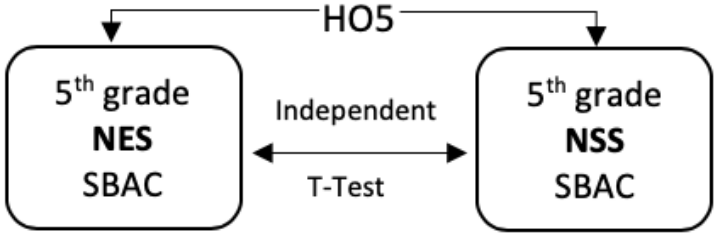
Note. In order to test this Null Hypothesis HO4; A two independent sample z-test for differences in population proportion was conducted for each passed/ "Meets" group. See Figure 7.

HO5: There is no difference in the mean math SBAC score of 5th grade NES and the mean math 5th grade SBAC score of the NSS in the dual immersion program.

HA5: There is a difference in the mean math SBAC score of 5th grade NES and the mean math 5th grade SBAC score of the NSS in the dual immersion program.

Figure 8

Illustrates the independent T-Test between 5th grade NES and NSS.



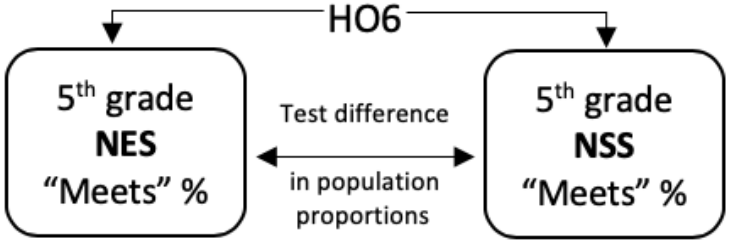
Note. In order to test this Null Hypothesis HO5; A two independent samples T-test was used to determine if there is a significant difference. See Figure 8

HO6: There is no difference in the percentage of the NES 5th grade students who passed and the percentage of the NSS 5th grade students who passed.

HA6: There is a difference in the percentage of the NES 5th grade students who passed and the percentage of the NSS 5th grade students who passed.

Figure 9

Illustrates the independent sample Z-Test between 5th grade NES and NSS.



Note. In order to test this Null Hypothesis HO6; A two independent sample z-test for differences in population proportion was conducted for each passed/ "Meets" group. See Figure 9

D. RESEARCH DESIGN

This design can be characterized as an inferential quantitative study. No independent variables were manipulated. A comparison was done between two convenient samples, native English speakers and native Spanish speakers, of different sets of two groups. To test each null hypothesis, I ran two different independent samples t-tests. The purpose of this test was to compare the mean scores of two groups. Furthermore, during this testing it was assumed that different scores are normally distributed among the two populations, the cases represent a non-random sample, and different scores are individual of each other.

E. TARGET POPULATIONS, SAMPLING METHOD, AND RELATED PROCEDURES

The target population is elementary school (3^{rd}-5^{th} grade) students in the state of Oregon. A non-random sampling was initially used to find participating TWI/Dual immersion school districts within Oregon, as this was a voluntary commitment. A non-random sampling was used when focusing on subgroups of native language and grade level.

F. INSTRUMENTATION

The data were obtained directly through two suburban Oregon school districts. The data request initiated through email request. See Appendix A and C for supporting data request documentation.

G. DATA COLLECTION

I obtained the data directly through Oregon school districts. A convenient non-random sample was used to identify elementary school students who participate within dual immersion programs. The data were compared between NES and NSS. District 1 of 2 requested a signed

"Data Confidentiality Agreement" (see Appendix C). The participating Oregon school districts offered their data voluntarily with interest in the findings.

H. DATA ANALYSIS PROCEDURE

An independent sample t-test was used to determine if there is any significant difference in SBAC math achievement between NES and NSS student groups. A z-test was also be used to determine the percentage of NES and NSS students who pass/ "meet" SBAC mathematics standards.

The t-test was selected to determine if there was a significant difference in the means between the NES and NSS student groups. This is a type of inferential statistic that looks at t-statistics and looks at the t-distribution values to determine a statistical significance between the two groups. For the purposes of this study, a t-test was the best option in comparing NES and NSS groups because it compared the mean mathematics SBAC scores between the two groups.

The z-test was selected to determine the population proportion of students who passed the mathematics SBAC test. This tests for a difference in the proportions. The z-test compared the two proportions to see if they are the same.

I. LIMITATIONS OF THE RESEARCH DESIGN

Limitations exist in collecting data. TWI/Dual immersion school districts must agree to share data. Because participation within TWI/Dual immersion programs is specific to school districts, random samplings of all students cannot take place. Samples must be taken from 3rd - 5th grades, known participants within public school dual immersion programs, therefore limiting the results.

J. INTERNAL VALIDITY

Efforts were made to incorporate or eliminate researcher bias by using all convenient samples provided. SBAC mathematics achievement scores can be influenced by several factors. These factors range from family socioeconomic status to testing environment. However, those factors were out of the researchers control as the study was done with ex post facto data.

K. EXTERNAL VALIDITY

The results may be internally valid within the sampled population of elementary school students participating within TWI/Dual immersion programs in Oregon. The results may not be valid for the general population of dual immersion students since the population of students does not represent all of Oregon's TWI/Dual immersion districts.

L. ETHICAL CONCERNS IN THE STUDY

This research was submitted to the Integrated Baseline Review (IBR) team to confirm the projects' appropriate planning and its readiness for implementation. The project was approved before requesting or acquiring the data. After the approval by IBR an MOU (see Appendix A and Table 11) was emailed out requesting TWI/dual immersion student data which included academic school years 2016-2019, grade level, race/ethnicity, special designations ELL/SPED/TAG, native language, gender, migrant designation, SES/FRL, SBAC testing language/Eng/Spn/Stacked, and SBAC math score. Once the data were received, the participating school districts were assigned pseudonyms to prevent identification (District 1 & District 2, see figures 1-3). All original data were maintained in its original format in order to maintain authenticity. All data were stored in password-protected files and will be destroyed after three years.

Chapter 4

RESULTS

A. INTRODUCTION

The results of the tests of null hypotheses one, two, three, four, five, and six, are below: The results are listed below to demonstrate relevant information as evidence of the acceptance or rejection of the null hypotheses. An explanation of all the findings will be detailed to determine the differences in mean and percentage of SBAC mathematics scores between NES and NSS students within TWI/dual immersion programs.

Results of Hypothesis 1

There is no difference in the mean math SBAC score of 3rd grade NES and the mean math 3rd grade SBAC score of the NSS in the dual immersion program.

Table 5

Sample T-test results for 3rd grade math SBAC scores from groups, NES and NSS.

Group	Mean	n	SD	df	t	P
NES	2459.86	194	79.65	df=370	t=12.0801	< 0.0001
NSS	2363.67	178	73.39			

The results of the two independent samples t-test for hypothesis 1 ($t(370) = 12.0801$, p= <0.0001) indicate that there is an "extremely" statistical significant difference in the mean SBAC scores between the 3rd grade NES and NSS students. The statistical means of the math scores and the standard deviations of the NES and NSS students are presented in Table 5. The calculated mean difference between NES and NSS in mathematics SBAC scores is 96.19. This value derived from the NSS group mean mathematics scores subtracted from the NES group

mean mathematics scores: 2459.86 - 2363.67 = 96.19, noting a 95% confidence interval of this difference.

Results of Hypothesis 2

There is no difference in the percentage of the NES 3rd-grade students who passed and the percentage of the NSS 3rd-grade students who passed in the dual immersion program.

Table 6

Sample Z-test results for 3rd grade students who passed.

Group	**NES**	**NSS**
Passed	120	22
Total	194	178
The value of z is 9.8162. The value of p is <.00001. The result is significant at p< .05.		

The results of the two independent samples Z-test for the difference in two population proportions indicates that there is a significant difference in the proportion of NES students and NSS students within the dual immersion program who passed the math SBAC. The sample proportion for NES used 120/194 and the sample proportion for NSS used 22/178. The NES group had statistically significantly more students that passed the math SBAC academic achievement test (.61) than the NSS group that passed the math SBAC achievement test (.12). z=9.8162, p=<0.00001. Thus, rejecting the null hypothesis that sample proportions are equal.

Results of Hypothesis 3

There is no difference in the mean math SBAC score of 4th-grade NES and the mean math 4th-grade SBAC score of the NSS in the dual immersion program.

Table 7

Sample T-test results for 4th grade math SBAC scores from groups, NES and NSS.

Group	Mean	n	SD	df	t	P
NES	2513.27	152	82.06	df=295	t=7.2520	<0.001
NSS	2387.84	145	196.00			

The results of the two independent samples t-test for hypothesis 3 ($t(295) = 7.2520$, $p = <0.001$) indicate that there is an "extremely" significant statistical difference in the mean SBAC scores between 4th grade NES and NSS students. The statistical means of the math scores and the standard deviations of the NES and NSS students are presented in Table 7. The calculated mean difference between NES and NSS in mathematics SBAC scores is 125.43. This value derived from the NSS group mean mathematics scores subtracted from the NES group mean mathematics scores: 2513.27 - 2387.84 = 125.43, noting a 95% confidence interval of this difference.

Results of Hypothesis 4

There is no difference in the percentage of the NES 4th-grade students who passed and the percentage of the NSS 4th-grade students who passed in the dual immersion program.

Table 8

Sample Z-test results for 4th grade students who passed.

Group	**NES**	**NSS**
Passed	98	18
Total	152	145
The value of z is 9.1922. The value of p is <.00001. The result is significant at p< .05.		

The results of the two independent samples Z-test for the difference in two population proportions indicates that there is a significant difference in the portion of NES students and NSS students within the dual immersion program who passed the math SBAC. The sample proportion for NES used 98/152 and the sample proportion for NSS used 18/145. The NES group had statistically significantly more students that passed the math SBAC academic achievement test (.64) than the NSS group that passed the math SBAC achievement test (.12). z=9.1922, p=<0.00001. Thus, rejecting the null hypothesis that sample proportions are equal.

Results of Hypothesis 5

There is no difference in the mean math SBAC score of 5th-grade NES and the mean math SBAC score of 5th-grade NSS.

Table 9

Sample T-test results for 5th grade math SBAC scores from groups, NES and NSS.

Group	Mean	n	SD	df	t	P
NES	2508.54	72	288.90	df=155	t=2.3612	0.0195
NSS	2406.66	85	251.74			

The results of the two independent samples t-test for hypothesis 5 ($t(155) = 2.3612$, $p = 0.0195$) indicate that there is a significant difference in the mean SBAC scores between 5th grade NES and NSS students. The statistical means of the math scores and the standard deviations of the NES and NSS students are presented in Table 9. The calculated mean difference between NES and NSS in mathematics SBAC scores is 101.88. This value derived from the NSS group

mean mathematics scores subtracted from the NES group mean mathematics scores: 2508.54 - 2406.66 = 101.88, noting a 95% confidence interval of this difference.

Results of Hypothesis 6

There is no difference in the percentage of the NES 5th-grade students who passed and the percentage of the NSS 5th-grade students who passed in the dual immersion program.

Table 10

Sample Z-test results for 5th grade students who passed.

Group	NES	NSS
Passed	43	10
Total	72	85
The value of z is 6.3318. The value of p is <.00001. The result is significant at p< .05.		

The results of the two independent samples Z-test for the difference in two population proportions indicates that there is a significant difference in the portion of NES students and NSS students within the dual immersion program who passed the math SBAC. The sample proportion for NES used 43/72 and the sample proportion for NSS used 10/85. The NES group had statistically significantly more students that passed the math SBAC academic achievement test (.60) than the NSS group that passed the math SBAC achievement test (.12). z=6.3318, p=<0.00001. Thus, rejecting the null hypothesis that sample proportions are equal.

B. SUMMARY OF RESULTS

The t-test compared the two groups NES and NSS by grade level. After the t-test examined whether NES and NSS means differ from one another, separate z-tests were used to

determine whether there is a percentage difference between NES and NSS students who passed the mathematics SBAC test. The results were examined and verified to see if there is a statistically significant difference in both the mean scores and the percentages between NES and NSS students who passed the mathematics SBAC test. This process identifies whether the null hypothesis listed above are rejected or not.

The two-tailed t-test for 3th grade TWI/dual immersion students from academic years 2016 to 2019 identified an extremely statistically significant difference in mean between NES and NSS students. The 2-tailed z-test for 3rd grade TWI/dual immersion students from academic years 2016-2019 identified a statistically significant difference in population proportion of students who passed the mathematics SBAC test between the NES and NSS students. The two-tailed t-test for 4th grade TWI/dual immersion students from academic years 2016 to 2019 identified an extremely statistically significant difference in mean between NES and NSS students. The 2-tailed z-test for 4th grade TWI/dual immersion students from academic years 2016-2019 identified a statistically significant difference in population proportion of students who passed the mathematics SBAC test between the NES and NSS students. The two-tailed t-test for 5th grade TWI/dual immersion students from academic years 2016 to 2019 identified a statistically significant difference in mean between NES and NSS students. The 2-tailed z-test for 5th grade TWI/dual immersion students from academic years 2016-2019 identified a statistically significant difference in population proportion of students who passed the mathematics SBAC test between the NES and NSS students.

Chapter 5

CONCLUSIONS, INTERPRETATIONS AND RECOMMENDATIONS

Introduction

This chapter presents the summary, conclusion and recommendations derived from the conduct of this study which was to discover if there is a difference between native English speakers' mathematical performance and native Spanish speakers' mathematical performance within the dual immersion programs in grades 3 to 5 in the state of Oregon. It also provides recommendations that can be pursued by the dual immersion mathematics teachers, administrators and district dual immersion program directors.

This quantitative inferential study used ex post facto data that were previously acquired from Oregon school districts' hosting TWI/dual immersion students' mathematics achievement scores (SBAC), to determine if there was a statistical difference in math achievement between the two-native language (NES and NSS) students. The math SBAC data for academic school years 2016-17, 2017-18 and 2018-19 was disaggregated by native language (NES and NSS) and by grade levels 3, 4, and 5 see Tables seven, eight and nine. The statistical tools used were mean, population proportion, two-tailed t-test and two-tailed 2-sample z-test to compare sample proportion.

Summary of Findings

How comparable are the two native language groups (3rd grade NES & 3rd grade NSS) in terms of their performance in the SBAC diagnostic tests in mathematics?

The 3rd grade native English-speaking students have a mean of 2459.86, while the 3rd grade native Spanish-speaking students have a mean of 2363.67. The data also revealed a p-value of less than 0.0001. Therefore, by conventional criteria anything less than 0.05 significance level, is

considered to be extremely statistically significant. Finally, the data revealed a z-value of 9.7 which is statistically significant and therefore rejecting the null hypothesis that sample proportions are equal.

How comparable are the two native language groups (4th grade NES & 4th grade NSS) in terms of their performance in the SBAC diagnostic tests in mathematics?

The 4th grade native English-speaking students have a mean of 2513.27 while the 4th grade native Spanish-speaking students have a mean of 2387.84. The data also revealed a p-value of less than 0.0001. Therefore, by conventional criteria anything less than 0.05 significance level, is considered to be extremely statistically significant. Finally, the data revealed a z-value of 9.2 which is statistically significant and therefore rejecting the null hypothesis that sample proportions are equal.

How comparable are the two native language groups (5th grade NES & 5th grade NSS) in terms of their performance in the SBAC diagnostic tests in mathematics?

The 5th grade native English-speaking students have a mean of 2508.54 while the 5th grade native Spanish-speaking students have a mean of 2406.66. The data also revealed a p-value equal to 0.0195. Therefore, by conventional criteria anything less than 0.05 significance level, is considered to be statistically significant. Finally, the data revealed a z-value of 6.3 which is statistically significant and therefore rejecting the null hypothesis that sample proportions are equal.

Conclusions

Based on the indicated findings, the following conclusions were drawn:

1. The NES group of TWI/dual immersion students consistently outperformed the NSS group of TWI/dual immersion students.

2. The findings revealed that the NES group of TWI/dual immersion students outperformed the NSS group of TWI/dual immersion students in all analyzed grades i.e. 3rd, 4th and 5th.

Implications for Practice

In this section, I discuss the implications of this research by briefly reviewing dual immersion programs, overall benefits of dual immersion, equity as a foundational element within dual immersion and how the results of this research impact dual immersion programs. I conclude with recommendations gleaned from the results of this research study.

Dual Immersion's Initial Purpose

Dual immersion programs were initially created to serve the diverse needs of the native Spanish-speaking population in the United States as ESL programs alone were considered insufficient (Stewner-Manzanares, 1988). This movement developed as the BEA/Title VII which was the first legislation to recognize the need for specific supports for students with limited English-speaking ability (Bilingual Educational Act, 1968). Through time, new legislation as the NCLB legislation overtook the BEA of 1968 and transformed the way bilingual programs supported native Spanish-speaking students by appealing to the dominant English culture. Bilingual programs began to appeal to mainstream America and began shifting the focus away from the specific bilingual needs of Spanish-speaking students. The shift focused on all students, which included language minorities and language majorities (Calderon & Carreon, 2000).

Overall Benefits

Since this significant change, the general research conducted on dual immersion programs have determined overall success in addressing the pressing needs of not just the language minority students, but also the language majority students which helps close the

achievement gap for English language learners (Genesee & Lindholm-Leary, 2010). The vast majority of dual immersion research establishes the higher rate of success in immersion education versus mainstream English programs (Ager, 2005; Cummins 1986; Genesee & Lindholm-Leary, 2010; Han, 2012; Hyltenstam, 1992; Krashen, 1996; Thomas & Collier, 2012; Tomlinson & Masuhara, 2010). To this point the research claims that, both native English speakers, regardless of race or ethnicity, and English learners in Dual Language classrooms score higher on state tests and norm-referenced tests than their counterparts in English-only programs (Thomas & Collier, 2012). Yet although it seems that dual immersion programs are successful in addressing native Spanish-speaking students' academic needs, upon closer inspection, statistical evidence from this research suggests, dual immersion programs may be failing the student populations they initially intended to serve (Vega, 2016).

Equity as a Foundation

The implications of this study prompt a look at equity and equality within dual immersion programs. Equity begins with the understanding that equality or sameness does not equate equity. I believe that equity means providing tools, support and opportunity toward the individuals' capacity and potential. Equity should be addressed from the creation of any systemic paradigm, while monitoring developing unintended consequences. Therefore, simultaneously, monitoring and reevaluating the atmosphere within and around the organizational constructs which allow study and exposure of attitudes, culture, and institutionalized practices that perpetuate systemic barriers towards equity.

Results Impact Dual Immersion

Through the equity lens from above, the patterns of the results are reviewed and recommendations are presented. The results of this study demonstrate the potential to impact the

constructs of current and future TWI/Dual immersion programs by making these math performance patterns plain. The mathematics SBAC scores demonstrate a clear pattern of NES students outperforming the NSS students in 3rd grade, 4th grade and in 5th grade. These disturbing findings demonstrate a clear pattern of dysfunction and prompt further research with a deeper look at the diverse high needs associated with dual immersion programs such as cohort mentally, tracking, behavior concerns, academic concerns, newcomer support concerns, new to TWI students concerns, and teacher to student ratio concerns. I believe that by looking at the above concerns; the TWI/dual immersion world begins to address inequities that extend over both NES and the NSS student populations. For the purposes of this study, the focus is on the staggering negative results of the NSS student population.

The outcome of this study supports further research within dual immersion programs' mathematics at a greater scale. This research found the specific analysis of mathematics test results by disaggregating math SBAC test results by native language NES and NSS, which gave a better understanding of the state of dual immersion programs, in the area of mathematics. In general, dual immersion programs lump together the SBAC math scores by district and school cohorts. This practice masks the true nature of native Spanish-speaking students' success or lack of success in mathematics. This research is one of the first to question the difference between mathematics success between NES and NSS students within dual immersion programs and I believe that this research will catapult awareness of this phenomenon within dual immersion programs across the state and eventually across the nation.

The difference in mathematics achievement between NES and NSS students is "extremely significant" where we need to ask as a collective educational system the hard questions as to what is working for NES that is not working for NSS students and why? By

continuing to lump together the scores of NES students and NSS students, we systematically perpetuate equity issues, because we fail to see that as a collective minority group, the dual immersion native Spanish-speaking students are not getting the targeted support they need. Finally, this research recommends for all educational organizations that host dual immersion programs to change the way they analyze their math data in order to acknowledge and support this at-risk student population.

Recommendations

The results of this research recommend research on a greater scale. This research should include an in-depth look at the original constructs of the program by asking critical hard questions. For example, does the program support both target groups NES and NSS? Are the program foundational constructs supporting the diverse needs of bilingual students? Does the program favor the dominant language or refer back to the dominant language? From an equity stance, does the program allow for monitoring of developing unintended consequences? For example, when deferring to English as the dominant language? Is the atmosphere within the dual immersion world studied in efforts to expose and interrupt attitudes, culture and institutionalized practices that may be perpetuating as a systemic barrier towards equity?

The second recommendation suggests a careful study of the programs supporting pillars in efforts to improve student outcomes; such as student to teacher ratios and student representation, addressing tracking students within the programs, the specific and diverse high needs within cohorts, and addressing cohort mentally that trigger behavior issues.

This research found that even within specialized programs that focus on bilingual, bicultural and biliteracy initiatives; the student to teacher ratio and representation is less than ideal. This study suggests bold staffing initiatives that use “strategic staffing for equitable

outcomes" (Blankstein et al., 2015, p. 122) that will target the diverse high needs of bilingual cohorts. A study done by the Charlott-Mecklenburg schools used bold staffing by moving administrators and teachers that have demonstrated gains in both student achievement and equity, to where there is most need. The Charlott-Mecklenburg schools also partnered with local universities to "grow their own" administrators with aligned goals, vision and mission towards equity. These two strategies proved to build value and meaning within all the aspects of the Charlott-Mecklenburg school system. Building value within a dual immersion cohort is paramount for both the students and the teachers involved. The students and the teachers begin to "buy into" the importance of bilingual education in general and disrupt the hierarchy of the dominant language over the minority language. In the example of CMS, the principals involved exercised autonomy as they recruited and revoked teachers accordingly. The teachers felt valued as they were recruited for their talents and reputation. The students felt valued and saw meaning in their education as teachers instilled a culture of high expectations along with providing appropriate supports. In the case of CMS, the collective gains were attributed to administrator and teacher empowerment, flexibility toward the mission, compensation as tangible incentives, district support with time, money and the people needed to facilitate the common vision. This type of built in value system has the potential to target the cohort mentally that both teachers and students adopt after a few years within dual immersion programs. Students become over familiar with their peers' hot buttons and they trigger unwanted behavior responses which disrupt their learning.

Furthermore, effective instruction is associated with higher student outcomes, regardless of the education model used (Hightower et al., 2011; Marzano, 2003; O'Day, 2009) and more importantly the effects of quality teachers are cumulative and long-lasting (Hightower et al.,

2011). In effect, good instruction is even more complicated in dual language programs because of the need to address the goals of bilingualism, biliteracy, and sociocultural competence; balance the needs of diverse student groups; and meet the needs of second language learners (Howard et al., 2007) therefore teacher to student ratios is an important factor to consider as well as how well teachers represent their student population.

The results of this research also suggests a detailed review at how we look at data. As detailed above, the specific review of disaggregated data has the potential to impact the constructs of current and future TWI/Dual immersion programs by making these math performance patterns plain. As one of the first research studies conducted to review data patterns between NES and NSS within dual immersion programs, this research found that by disaggregating the data between dual immersion NES and NSS students, a better picture of each student group is presented. Furthermore, by disaggregating the data and studying the patterns, each student group can get the differentiated supports needed. These supports need to be intentional and scaffolded as different native languages have specific needs. By understanding these data patterns by language group, dual immersion programs can not only support student outcomes for one group, but for all student groups within these programs, while implementing best practices for bilingual instruction.

The results of this research also suggests targeting bilingual best practices within dual immersion programs to support all student groups within these programs. As previously discussed bilingual education is more complex because of how language differs from one language to the other. The students continually draw on one language to support the other language (August et al., 2014; Riches & Genesee, 2006). It is extremely important to implement a variety of techniques in efforts of reaching a variety of language proficiencies (Kandel-Cisco et

al., 2014). What's more, best bilingual practices suggest positive interactions with teachers, when teachers use positive social and instructional interactions equitable with both English learners and native English speakers, both groups perform better academically (Doherty et al., 2003).

Finally, using bilingual best practices within dual immersion programs promise to bridge the gap between native English-speaking students and native Spanish-speaking students. Equity being the foundation of such practices, determines replacing subtractive language which can perpetuate negative attitudes towards native Spanish-speaking students and implementing additive practices instead. Spanish-speaking students face inequities through systemic barriers such as negative attitudes, SES, funds of knowledge ignored or discounted, and the lack of appropriate scaffolding thus enabling "endangerment" (Blankstein et al., 2015). By understanding the true patterns of placement data, we can avoid such *endangerment* and begin to support all language groups within dual immersion programs.

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Appendices

Appendix A

RE: Data Request Letter of Oregon school districts

Dear TWI/Dual Immersion data manager,

As an Ed.D. candidate of George Fox University, I am in the middle of a dissertation study which is looking at TWI/Dual immersion students' math achievement scores from 3rd to 5th grade for the last 4 years. In particular, I am looking at the SBAC math achievement scores from years 2016-2019. I am studying the correlation (if any) between the TWI/Dual immersion students' SBAC math achievement and their Native language. I assure you that all student and school identifying information will be protected and excluded from publication. The two most important pieces of information for this study are the students' native language and their SBAC math scores for the years 2016-2017, 2017-2018, and 2018-2019. My specific request for your districts data can be filled into the table below. You may also send me your data in its raw format for your convenience. I appreciate your participation in my request and promise to relay pertinent findings to you as they become available.

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Table 11

Math SBAC data request form

Math SBAC data request									
# of students:		Pseudo name for School district: School pseudonym:___							
Year	Grade	Race/ Ethnicity	**Native Language**	ELL/ SPED/ TAG	GDR	Migrant	SES/ FRL	Test Lang. Eng/ Span/ Stacked	SBAC Math Score
2016-2017	3rd grade								
*add A new row per student									
2016-2017	4th grade								
*add A new row per student									
2016-2017	5th grade								
*add A new row per student									
2017-2018	3rd grade	Race/ Ethnicity	**Native Language**	ELL/ SPED/ TAG	GDR	Migrant	SES/ FRL	Test Lang. Eng/ Span/ Stacked	SBAC MATH Score
*add A new row per student									
2017-	4th								

2018	grade								
*add A new row per student									
2017- 2018	5th grade								
*add A new row per student									
2018- 2019	3rd grade	Race/ Ethnicity	**Native Language**	ELL/ SPED/ TAG	GDR	Migrant	SES/ FRL	Test Lang. Eng/ Span/ Stacked	SBAC Math Score
*add A new row per student									
2018- 2019	4th grade								
*add A new row per student									
2018- 2019	5th grade								
*add A new row per student									

Note. Table 5 does not have the **SBAC Psychometric Grading Scale.**

Appendix B

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5

GEORGE FOX UNIVERSITY HSRC INITIAL REVIEW QUESTIONNAIRE

Title: Mathematics Achievement & Native Language within Dual Immersion Programs

Principal Researcher(s): Cristina Alcaraz-Juárez

Date application completed: November 1st, 2021

(The researcher needs to complete the information above on this page.)

COMMITTEE FINDING:

_✓_ (1) The proposed research makes adequate provision for safeguarding the health and dignity of the subjects and is therefore approved.

_____ (2) Due to the assessment of risk being questionable or being subject to change, the research must be periodically reviewed by the **HSRC** on a basis throughout the course of the research or until otherwise notified. This requires resubmission of this form, with updated information, for each periodic review.

_____ (3) The proposed research evidences some unnecessary risk to participants and therefore must be revised to remedy the following specific area(s) on non-compliance:

_____ (4) The proposed research contains serious and potentially damaging risks to subjects and is therefore not approved.

_____ 12/1/21

Chair or designated member Date

Appendix C

Appendix C

Data Confidentiality Agreement

Access to the [redacted] Data Systems will be granted to those individuals who have been determined to have a legitimate educational interest in the data. Individuals who have been granted access to these systems must understand and accept the responsibility of working with confidential records. The records contained in the [redacted] Data Systems may have multiple school, district, and data owners.
All users authorized to access the [redacted] Data Systems are required to abide by the policies governing review and release of student education records. The Family Educational Rights and Privacy Act (FERPA) of 1974 mandates that information contained in a student's education record must be kept confidential and outlines the procedures for review, release and access of such information.

FURTHERMORE:

- I will NOT share my user name and password with anyone (substitutes, students, etc.)
- I will only view data for which my organization is responsible, under normal circumstances.
- I agree that I will be a responsible user of data; data I export will be stored securely, and I will destroy confidential data in an appropriate manner (such as shredding, removing all traces of data files from computer, etc.) when no longer needed.
- I will make every reasonable effort to maintain privacy of the data.
- Prior to sharing data with others, electronically or otherwise, I will ensure that the recipient is authorized and has a need to access the data and understands their responsibilities.
- I will signoff (or lock the screen) my session when not using it, and agree to report any unauthorized data access to a supervisor.
- I am responsible for protecting the security of the records and confidentiality of the information to which I have access. Specifically:
  - I will neither knowingly include nor cause to be included a false or misleading entry in any record.
  - I will not copy, reproduce, electronically print, or forward any record, except in the performance of my defined duties.
  - I will not divulge, in any way, knowledge of any confidential information that I have learned.

Agreement for an Electronic Communications Systems Account

I have read the district's Electronic Communications System policy and administrative regulation and agree to abide by their provisions. I understand that violation of these provisions will result in suspension or revocation of system access and related privileges and/or referral to law enforcement officials.
In consideration for the privilege of using the district's Electronic Communications System and in consideration for having access to the public networks, I hereby release the district, its operators and any institutions with which they are affiliated from any and all claims and damages of any nature arising from my use of inability to use the system including, without limitation, the type of damages identified in the district's policy and administrative regulation.

Signature: Cristina Alcaraz-Juarez Date: 12/15/2021

Cristina Alcaraz-Juarez

- E-mail - e-mail coming into the district will be filtered for spam, viruses and content inappropriate to an educational setting. Sites that do not meet [redacted] Materials Selection Policy Guidelines

Review Process

The technology of Internet filtering software is not perfect. Both "over blocking" and "under blocking" can occur. Some sites can get blocked even though they do not violate either CIPA guidelines or the District's Acceptable Use Policy.

Students and staff may need access to sites that deal with controversial issues for legitimate research and educational purposes. For example, a breast cancer site might be blocked because it contains the word "breast." On the other hand, sites that do violate the policies may slip through the filter process. For example, a site may contain pornographic pictures but the text might consist of a patriotic tribute to our troops in Afghanistan, so the filtering software does not detect the actual content of the site.

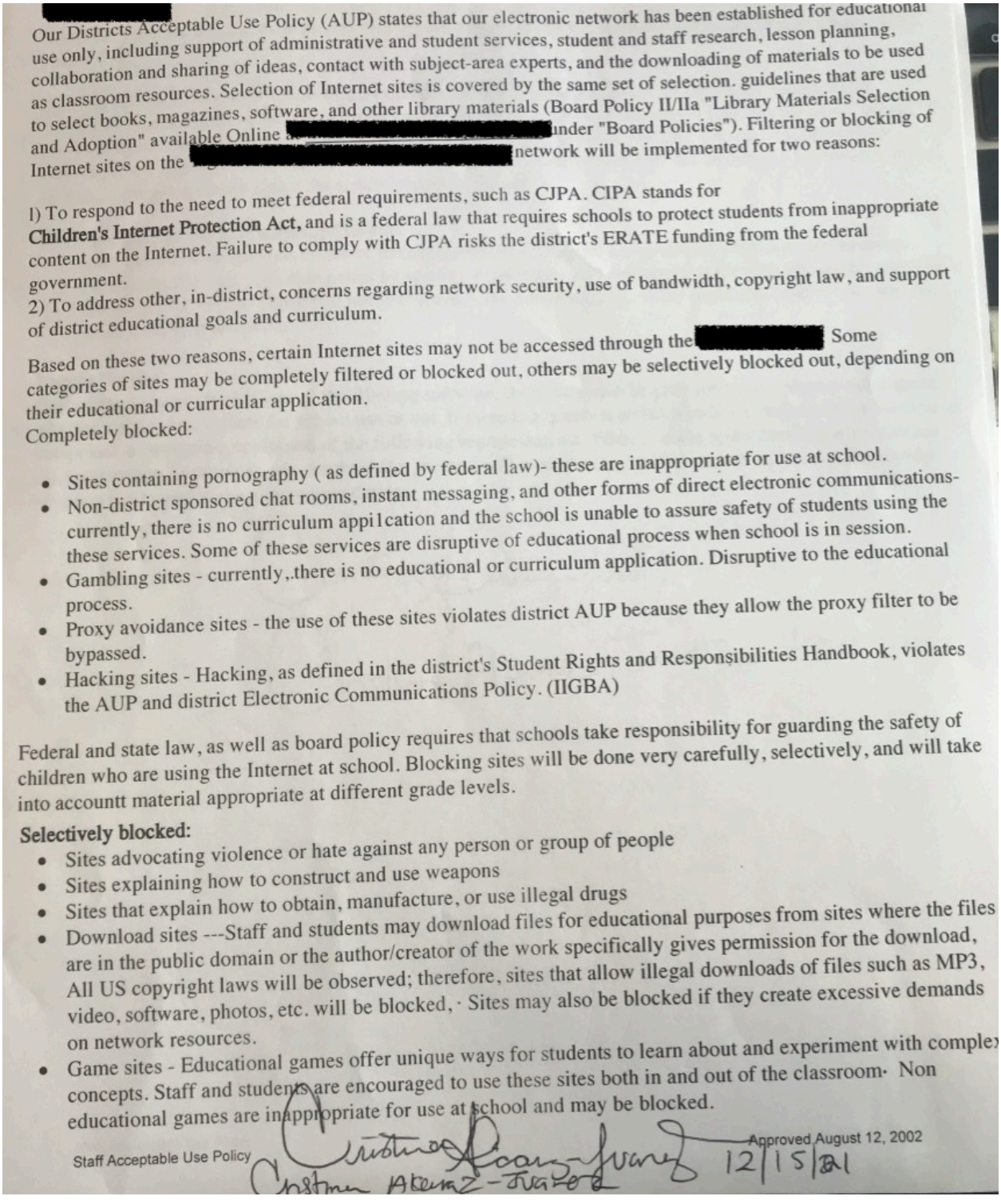
Process to request block of inappropriate site:

1. Staff should make students aware of their responsibility to report inappropriate sites to a staff member.
2. Submit requests for unblocking sites by sending email to the network email to the network administrator at [redacted]. This email needs to include the complete URL of the site and a brief reason why the block should be removed.

Further Review

Beyond the technological issues of the filtering software, there may also be philosophical disagreements about whether a site is appropriate for school use or not. If there is a question about whether a site should be blocked or unblocked, a committee composed of the following representatives: library media specialists (2), administrator (3), Information Technology (4), teachers (5), parents, will evaluate the site in terms of our district's materials selection policy and make a recommendation.

Christina Alcaraz-Juarez 12/15/2021



[redacted] Our Districts Acceptable Use Policy (AUP) states that our electronic network has been established for educational use only, including support of administrative and student services, student and staff research, lesson planning, collaboration and sharing of ideas, contact with subject-area experts, and the downloading of materials to be used as classroom resources. Selection of Internet sites is covered by the same set of selection. guidelines that are used to select books, magazines, software, and other library materials (Board Policy II/IIa "Library Materials Selection and Adoption" available Online [redacted] under "Board Policies"). Filtering or blocking of Internet sites on the [redacted] network will be implemented for two reasons:

1) To respond to the need to meet federal requirements, such as CJPA. CIPA stands for **Children's Internet Protection Act,** and is a federal law that requires schools to protect students from inappropriate content on the Internet. Failure to comply with CJPA risks the district's ERATE funding from the federal government.
2) To address other, in-district, concerns regarding network security, use of bandwidth, copyright law, and support of district educational goals and curriculum.

Based on these two reasons, certain Internet sites may not be accessed through the [redacted] Some categories of sites may be completely filtered or blocked out, others may be selectively blocked out, depending on their educational or curricular application.
Completely blocked:

- Sites containing pornography (as defined by federal law)- these are inappropriate for use at school.
- Non-district sponsored chat rooms, instant messaging, and other forms of direct electronic communications- currently, there is no curriculum appi1cation and the school is unable to assure safety of students using the these services. Some of these services are disruptive of educational process when school is in session.
- Gambling sites - currently,.there is no educational or curriculum application. Disruptive to the educational process.
- Proxy avoidance sites - the use of these sites violates district AUP because they allow the proxy filter to be bypassed.
- Hacking sites - Hacking, as defined in the district's Student Rights and Responsibilities Handbook, violates the AUP and district Electronic Communications Policy. (IIGBA)

Federal and state law, as well as board policy requires that schools take responsibility for guarding the safety of children who are using the Internet at school. Blocking sites will be done very carefully, selectively, and will take into accountt material appropriate at different grade levels.

Selectively blocked:

- Sites advocating violence or hate against any person or group of people
- Sites explaining how to construct and use weapons
- Sites that explain how to obtain, manufacture, or use illegal drugs
- Download sites ---Staff and students may download files for educational purposes from sites where the files are in the public domain or the author/creator of the work specifically gives permission for the download, All US copyright laws will be observed; therefore, sites that allow illegal downloads of files such as MP3, video, software, photos, etc. will be blocked, · Sites may also be blocked if they create excessive demands on network resources.
- Game sites - Educational games offer unique ways for students to learn about and experiment with complex concepts. Staff and students are encouraged to use these sites both in and out of the classroom· Non educational games are inappropriate for use at school and may be blocked.

Staff Acceptable Use Policy

Approved August 12, 2002

12/15/21