EFFECTS OF IMMERSION INSTRUCTION DESIGN:

A CASE STUDY OF TWO CHINESE IMMERSION PROGRAMS ON

BILITERACY DEVELOPMENT

by

Li Li Lin

An education leadership portfolio submitted to the Faculty of the University of Delaware
in partial fulfillment of the requirements for the degree of Doctor of Education in
Educational Leadership

Fall 2022

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Approved: _____
Steve Amendum, Ph.D.
Interim Director of the School of Education

Approved: _____
Gary T. Henry, Ph.D.
Dean of the College of Education and Human Development

Approved: _____
Louis F. Rossi, Ph.D.
Vice Provost for Graduate and Professional Education and
Dean of the Graduate College

I certify that I have read this education leadership portfolio and that in my opinion it meets the academic and professional standard required by the University as an education leadership portfolio for the degree of Doctor of Education.

Signed: _____

Danielle Ford, Ph.D.
Professor in charge of education leadership portfolio

I certify that I have read this education leadership portfolio and that in my opinion it meets the academic and professional standard required by the University as an education leadership portfolio for the degree of Doctor of Education.

Signed: _____

Christina M. Budde, Ph.D.
Member of education leadership portfolio committee

I certify that I have read this education leadership portfolio and that in my opinion it meets the academic and professional standard required by the University as an education leadership portfolio for the degree of Doctor of Education.

Signed: _____

Scott Lykens, Ed.D.
Member of education leadership portfolio committee

I certify that I have read this education leadership portfolio and that in my opinion it meets the academic and professional standard required by the University as an education leadership portfolio for the degree of Doctor of Education.

Signed: _____

Haihong Yang, Ph.D.
Member of education leadership portfolio committee

ACKNOWLEDGMENTS

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ABSTRACT

China's rising economy has increased the popularity of learning the Chinese language. Chinese immersion programs have gained popularity in K-12 education, particularly for younger learners. However, research on the optimal instruction design for Chinese and English biliteracy development in one-way Chinese immersion programs is scarce. This Educational Leadership Portfolio (ELP) adopted the method of a case study. Two sample programs were recruited to explore the ratio of the two-program language used in the instruction design in order to understand how two-language allocation decisions affect Chinese biliteracy development.

The study collected students' data on the state accountability assessment of English Language Arts (ELA) and summative assessment data of Chinese Language Arts (CLA) for three consecutive years from 2017 to 2019. Both programs' immersion teachers participated in an online survey to obtain contextual information on (a) the ratio of the two program languages used in daily instruction, (b) the instruction time schedule for CLA and ELA, respectively, (c) professional development (PD) on literacy instruction, and (d) literacy instruction strategies. By drawing on the teacher survey results and students' assessment data of the two programs, the study suggests that instruction design played a crucial role in Chinese literacy development. The effects of instruction design are reflected in early literacy development, adequate instruction time for CLA, and two languages transfer in teaching academic subjects. In light of the study's findings, recommendations are provided for crafting an instructional design that integrates early oral language development, protected CLA instruction time, as well as academic subjects taught in both languages.

Chapter 1

INTRODUCTION

Roberts and Talbot (2009) proposed that monolingualism is the illiteracy problem of the 21st Century. Global language proficiency is increasingly vital to local and international individuals' professional and personal lives. However, it was recently revealed that less than 20% of K-12 public school students in the United States studied another language, and only 8% of college and university students enrolled in a language course other than English (Stein-Smith, 2018).

According to the Asia Society (2006), the number of Chinese language programs in K-12 schools across the U.S. tripled between 1995 and 2006 due to the increasing importance of dual language competency in the 21st Century job market. Among Chinese language programs, those focused on one-way Chinese immersion were in high demand. By 2019, according to the Mandarin Chinese Parents Council (2019), there were more than 300 Mandarin Chinese immersion schools across 31 states, including charter, private, and public schools. Roberts and Talbot (2009) expressed hope that widespread language immersion programs might mitigate the lack of language literacy for future generations to meet the increasingly diverse job market needs.

The most significant recent development with regard to Chinese immersion education was when two state-funded initiatives launched immersion programs in public schools in Utah and Delaware. Utah implemented a language immersion program in

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2008. Delaware's program, which started in 2012, was modeled after the Utah program. The two initiatives were considered significant milestones in the growth of language immersion programs in public schools because (Boyle et al., 2016; Li et al., 2016; Steele et al., 2019; Watzinger-Tharp et al., 2018), in the past 30 years, most states' language immersion programs were implemented without state funding (Leite & Cook, 2015).

In 2010, Delaware Governor Jack Markell proposed the World Language Expansion Initiative (WLEI) in response to the loss of several significant international corporate headquarters. Markell believed that corporations moved away from Delaware due to a lack of a local multilingual workforce. The WLEI aimed to prepare future generations of Delaware students with the multilingual skills necessary to compete in an increasingly interconnected global economy (Markell, 2011).

The Delaware State Senate approved funding to provide language immersion education[1] in public schools in 2011. Delaware students would study either Chinese or Spanish beginning in Kindergarten and continue their language study through secondary school and college. This continuous pipeline of language immersion education is intended to achieve advanced-level bilingual and biliteracy skills by graduation to meet the demands of a global, multilingual 21st Century workforce.

The first Chinese immersion program was implemented in the Kindergarten in Kent County the following year, 2012. According to the 2018-2019 immersion learners' achievement report (published by the Department of Education [DOE]), the Chinese

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[1] Language immersion education is considered a type of bilingual education.

immersion program showed promising results with immersion students outperforming their non-immersion peers on the state accountability assessments in ELA and math. However, less than 20% of the immersion learners in the same group reached the grade-level Chinese literacy benchmark, which the DOE set at 80%, especially in reading and writing. In other words, the program may not be on the right track to achieving biliteracy, as set by DOE.

This ELP is a case study comparison of two Chinese immersion programs with different instruction designs. One was recruited in the State of Delaware (School A) and the other from Washington, DC (School B). The case study aimed to investigate whether students' Chinese literacy learning outcomes differ despite the two programs sharing the same one-way[2] immersion model. Program profiles for each campus were established via teachers' feedback from an online survey. Student achievement data for CLA and ELA from school year 2017 to 2019 was collected (Data beyond 2019 was not sought due to disruptions from the Covid-19 pandemic).

A statistical analysis of students' achievement data was conducted to determine whether the instruction design affects Chinese literacy development, and if the program met its biliteracy goal. Using the results of these data analyses, a new instruction design was recommended for improving Chinese literacy skills. Public and program stakeholders were informed of the study's findings and recommendations in an effort to ensure the program will achieve its biliteracy objectives.

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[2] Majority of learners in one-way immersion programs are native English speakers.

Organization of the ELP

The ELP is organized into six chapters and appendices. Chapter 2 presents the problem addressed and the program context for Schools A and B for the case study. Chapters 3 and 4 present the improvement strategies and their results, including recommendations. Chapters 5 and 6 discuss my reflections on the improvement strategies and my personal reflections on personal growth and leadership development. Finally, a series of the nine appendices, the ELP artifacts, are provided, ranging from the logic model for the Chinese immersion program to the summary of the case study findings, which demonstrate the improvement effort executed to achieve the overarching goal of improving Chinese literacy proficiency.

Chapter 2

PROBLEMS ADDRESSED

This section includes background information regarding language immersion, the types of immersion programs, and instruction designs in Chinese immersion programs. Language immersion is a growing field, so it is appropriate to begin by defining language immersion. In addition, discussions include the implementation procedures of the Chinese immersion program established by the DOE in Delaware, the immersion programs' operational structure in the state, and their working relations with the local school districts.

The program contexts of the two schools are also introduced. I include students' demographic data, school staff, and records regarding academic performance, as well as a description of the program design and immersion instruction model.

What is Language Immersion?

The foundation of language immersion education was built upon content-based language instruction (Tedick et al., 2001). A critical difference between language immersion and traditional language programs is that the non-English target language[3] functions as a vehicle for accessing content. According to Fortune and Tedick (2008), native English-speaking students in language immersion programs learn school academic subjects in the non-English target language. In some of the immersion programs, students

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[3] The term is used interchangeable with partner language. In language immersion programs, a target or partner language is the non-English language selected for learning along with the English language.

learn academic content exclusively in the target language in the early grades of pre-Kindergarten, Kindergarten, and first grade.

Research demonstrated the benefits of content-based instruction[4] (CBI) for learning a new language or additional languages. In the 1990s, Curtain and Haas (1995) and Met (1991) found new language competency increased with the CBI approach because students learned language best when there was an emphasis on teaching relevant, meaningful content rather than focusing on teaching the language itself. CBI provided cognitive engagement. Tasks that were intrinsically interesting and cognitively engaging led to more and better opportunities for second language acquisition (Grabe & Stoller, 1997). CBI is considered a practical teaching approach since language learning is most effective when used as a means, not an end (Richards & Rodgers, 2001).

Fortune and Tedick (2008) distinguished between two types of immersion programs: one-way and two-way. A one-way immersion program served predominately native English-speaking learners who aimed to learn new languages other than English. The two-way immersion program served an equal number or close to an equal number of English-speaking students and non-English speaking students (e.g., Chinese, French, Korean, or Spanish). The two-way language immersion program participants aimed to be fully bilingual and bi-literate in both program languages. Delaware Chinese immersion

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[4] Content-Based Instruction is an approach to language teaching that focuses on what is being taught using the additional language rather than teaching the new language itself. Meaning the new language becomes the medium through which new subject-related material is learned (e.g., math, science, social studies).

programs were regarded as one-way immersion programs because they served

predominately native English-speaking students.

The following definitions, commonly used in language immersion education, may

contribute to a more nuanced understanding of the concept of educational language

immersion. Generally, language education scholars considered language immersion to be

a type of bilingual education (Watzinger-Tharp et al., 2018). Howard et al. (2018)

clarified that bilingual education referred to the utilization of two languages as a means of

instruction to drive both school subject content acquisition and language literacy for

students enrolled in programs over a sustained period (at least five years). This

interpretation differed from teaching a second language as a subject itself.

Historically, bilingual education in the U.S. was intended for non-native English

speakers to gain proficiency in English. Gandara and Escamilla (2017) stated that over

the prior 20 years, the renewed meaning of bilingual education as a dual language

program has also been developed to serve monolingual English-speaking students

learning additional languages. A dual language program was also termed *additive*

bilingual education because students gained additional language skills (Baker, 2011;

Crawford, 2004). The goal of a dual language bilingual program was to develop

bilingualism as well as biliteracy and cross-cultural competence.

Dual language immersion was defined by Fortune and Tedick (2008) as a

language education model dedicated to additive bilingualism and biliteracy with a

minimum of 50% of the daily subject matter taught in the target[5] language at the elementary level. Delaware and Utah used the term as an umbrella term to refer to all of their immersion programs. In the current study, the term Dual Language Chinese Immersion (DLCI) is used to refer to Chinese immersion programs in Delaware.

Organizational Context

In 2011, the Delaware Department of Education (DDOE) was charged with implementing dual language immersion programs. Based on DDOE organizational structure (Exhibit A), Dual Language Immersion (DLI) staff is part of the World Language Group (WLG) in the DDOE. Prior to 2011, the WLG comprised two individuals only: one Education Associate and one Administrative Assistant. With state-approved funding for implementing the DLI programs in the state, in 2011, the DDOE hired three additional staff members: one Education Specialist, one Instructional Coach for Chinese immersion programs, and one Instructional Coach for Spanish immersion programs, all of whom reported to the Education Associate who has oversight of dual language, world language, and professional development programs across the state.

Figure 2.1 illustrates the structural relationship between DLCI districts and DOE.

Figure 2.1

Dual Language Immersion Operational Structure at DOE

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[5] The term is used interchangeably with partner language.
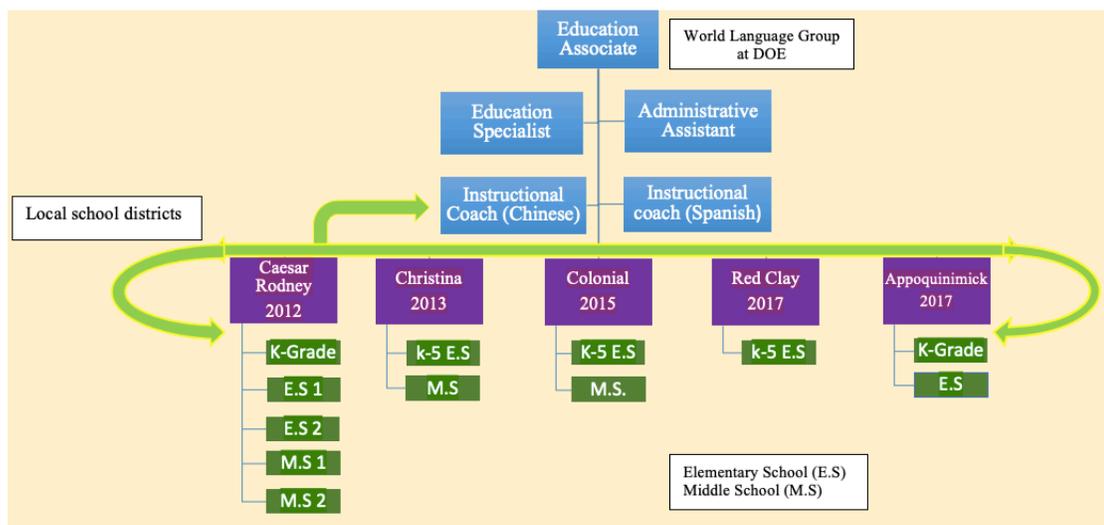
Due to the top-down structure of the DDOE (Figure 1), personnel at the top of the WLG generally have no direct interaction with the personnel within the DLCI school community. The WLG Education Associate has decision-making authority and decides how the DLCI programs should be implemented and executed.

On the other hand, the instructional coaches at WLG visit schools daily to provide support to classroom teachers and administrators. They have become liaisons between the WLG and the DLCI community. Coaches receive invaluable feedback from the classroom and the program and school leadership teams, passing this information on to the group leader who is responsible for seeking solutions and tackling challenges facing the DLCI in bi-weekly meetings with the Education Associate.

DLCI Program Instructional Model

Watzinger-Tharp et al. (2018) discussed Delaware's adoption of Utah's[6] 50/50 instructional model for its first Dual Language Chinese Immersion (DLCI) program. According to the 50/50 model, all DLI programs, Chinese and Spanish, were aligned with the 50/50 two-teacher model from Kindergarten through fifth grade. In the 50/50 model, students spent about half of their school day with one teacher who provided exclusive instruction utilizing the Chinese language and the rest of the day with another teacher who provided instruction using the English language.

According to Watzinger-Tharp et al. (2018), Utah implemented consistent curricula to promote biliteracy in both languages and meet established proficiency targets for all four skills (listening, speaking, reading, and writing) at each grade level. Proficiency in a non-English target language was measured using the Assessment of Performance of Proficiency in Languages (AAPPL) designed by the American Council on the Teaching of Foreign languages (ACTFL). This assessment was administered at the end of each school year from grades three through nine, with the goal of 80% of DLI students meeting proficiency benchmarks for each grade level (Watzinger-Tharp et al., 2018). Delaware followed the language proficiency benchmark established by Utah with the same goal of 80% of students meeting grade-level standards for Chinese language proficiency. More details of instruction design are elaborated in the context of School A.

Organizational Role

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[6] Utah started the state-funded immersion programs across the state public schools in 2009.

At the end of the 2013-2014 school year, both Chinese and Spanish instructional coaches hired in 2011 resigned simultaneously. I joined the WLG team in June of 2016 upon my retirement from New Jersey. The DLCI had been in operation for about four years by then. Therefore, I was not involved in the launch process (program planning, instructional model design, and selection of materials). By 2016, the first cohort of students, who started in 2012, had entered the fourth grade.

My role as an instructional coach was to provide instructional support to the twelve Chinese programs in Kent and New Castle Counties. I also assisted school principals in matters that were directly related to the Chinese immersion program. My primary scope of responsibilities was to provide pedagogical coaching to classroom Chinese teachers to increase their instruction capacities to optimize students' learning outcomes. Chinese is a complex language with linguistic differences compared to alphabetic languages; therefore, Chinese curriculum development and Chinese literacy instruction require a specific set of skills and expertise knowledge.

My role as the only native Chinese speaker within the WLG led me to many more responsibilities related to Chinese immersion, including professional development planning, curriculum development, informal assessments designing, coordinating teleconferences with native Chinese speakers for intercultural exchange, parent support events, open-houses for Chinses immersion programs, and recruiting volunteer-support staff to help struggling learners in the Chinese immersion classrooms which were most in need. It was my passion for promoting language immersion that motivated me to take on these tasks without hesitation. The skills and knowledge I acquired during my tenure

leading a K-12 Chinese immersion program in New Jersey public schools prepared me to tackle the challenges facing Delaware's DLCI programs.

Furthermore, as an instructional coach, I was offered opportunities to interact with the frontline instructional team and the school-level leadership team. The interaction and daily observation allowed me to gain first-hand knowledge of the concerns shared at each program site. Most importantly, I was very fortunate to work with a dedicated team of Chinese instructors and supportive school-level leadership. With collective team effort, we were diligently working to address concerns about updating the Chinese literacy curriculum to a Common Core-aligned, vertical articulation, and made proposals and recommendations through the channel of command. As the DLCI program was sponsored and monitored by the DDOE, the decision-making authority was not at the local school level. In this case, we were merely the passengers, and our efforts have not yet led to the desired results. A needs assessment of DLCI has been overdue for years, and many concerns remain unresolved. Nevertheless, the continued challenges in DLCI refreshed my passion, energized, and motivated me to choose the topic for this ELP.

Program Context: School A

Academic Performance

School A is one of seven elementary schools serving first through fifth grade students within the district. Kindergarten is located in another building. The school district comprises 14 schools serving about 8,000 students in the county. School A was named a National Blue-Ribbon School in 2013 and a National Title I Distinguished School in 2017. DDOE adopted the Smarter Balanced Summative Assessment of English Language Arts and Mathematics as the state accountability assessment. It is administered

annually for students in grades three through eight. Data from the Smarter Balanced Summative Assessment of English Language Arts and Mathematics for School A during 2018-2019 indicate that 83% of students were proficient in ELA, and 72% were proficient in mathematics.

Student and Staff

DOE report card from the 2018-2019 school year indicated School A had 663 students and a 16:1 student-teacher ratio. In addition, more than 87% of the teachers had five or more years of teaching experience. Using the report card data, Figure 2.2 illustrates the student enrollment by race and ethnicity in the 2018-2019 school year.

Figure 2.2

School A Student Demographics (Enrollment by Race/Ethnicity 2018-2019)
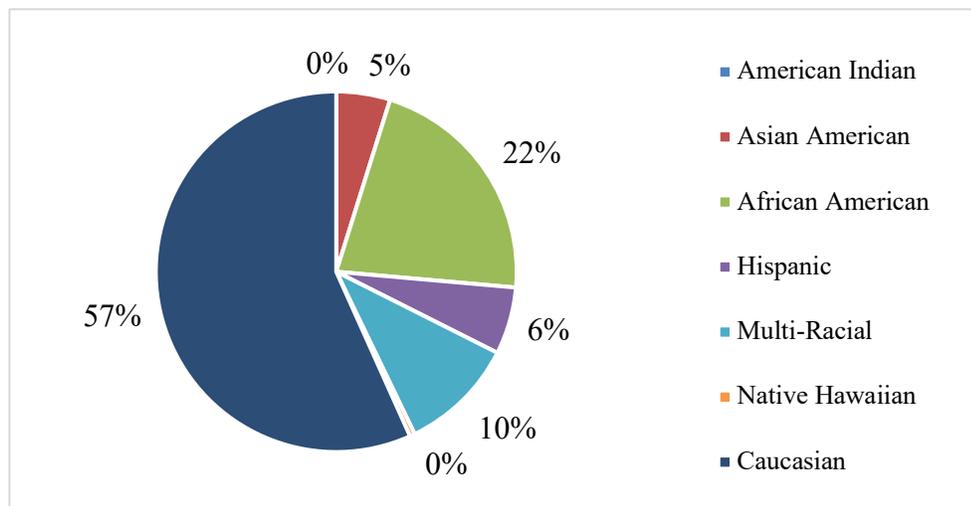
Note: Adapted from report card published by Department of Education DE
https://reportcard.doe.k12.de.us/detail.html#aboutpage?scope=school&district=10&school=610

Among the student population in School A, about 17% were from military families because the school is close to an Air Force base. The base is home to the

Department of Defense's largest aerial port and nearly 11,000 airmen and joint service members, civilians, and families (Dove Air Force Base, n.d.).

School A Chinese Language Immersion Program

School A was one of the first two schools to begin Delaware's Chinese language immersion program. The first cohort started in Kindergarten in 2012 and moved up to first grade to School A in 2013. The cohort students are currently in the eighth grade during the 2021-2022 school year. A Chinese literacy curriculum was not in use at the time of this study, but a pacing guide for the Chinese teaching materials was in place for teachers' reference.

As mentioned earlier, the DLCI instruction model was implemented with the similar model initiated in Utah in 2009. While the Utah model has undergone many updates over the years, the Delaware DLI immersion program has remained the same. Based on the program document from School A, Figure 2.3 illustrates how the two languages were used in the daily instruction based on the model decided by DDOE during the time of this study.

Figure 2.3

School A: Chinese and English Language Allocation in teaching academic subjects

School A: Chinese/English Language Allocation
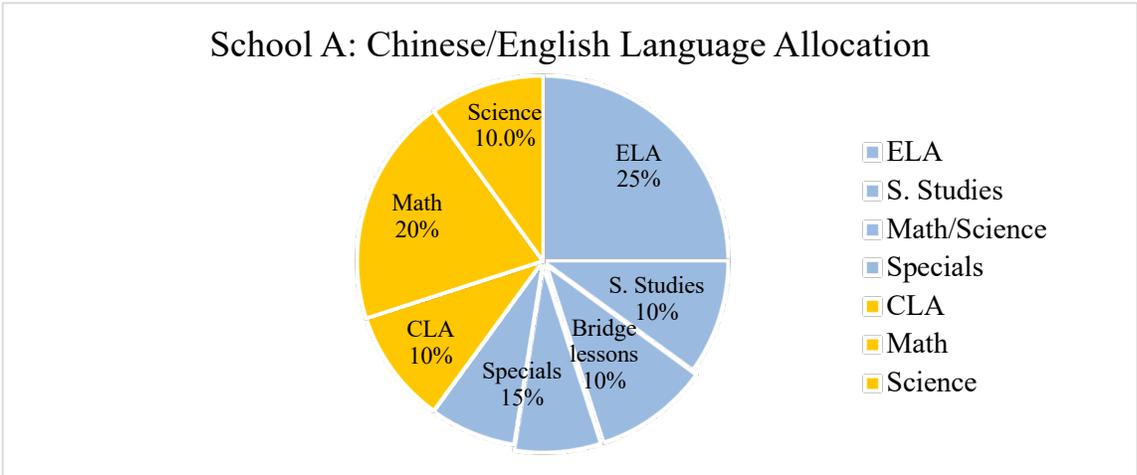
In Figure 2-3, subjects indicated in yellow color were taught in Chinese, while those indicated in blue color were taught in English. The two languages switched daily in the middle of the day. As shown in Figure 2.3 students received about half of the day's instruction (about 150 minutes) in Chinese for math, science, and CLA, and the other half of the day (50%) was designated primarily for ELA in English.

Figure 2.4

Immersion Student Demographics (Enrollment by Race/Ethnicity 2018-2019)
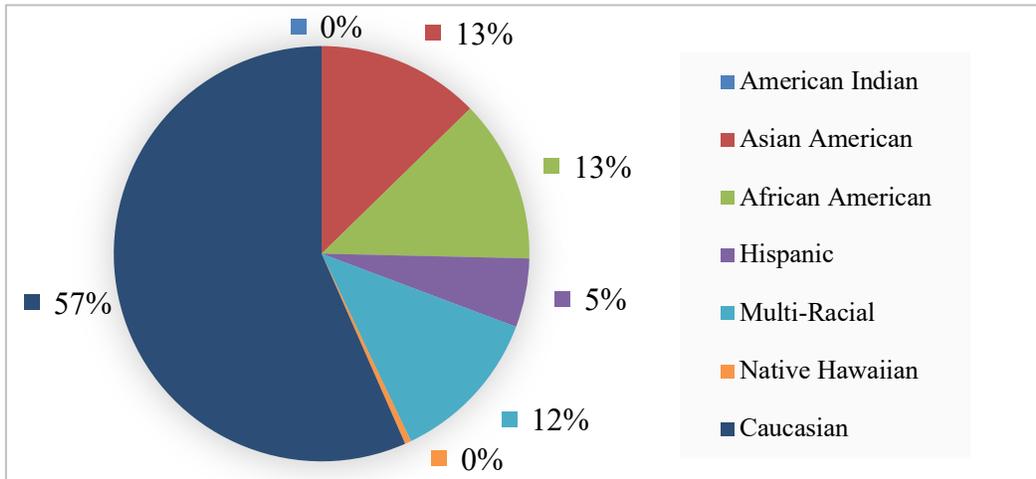
The students enrolled in DLCI reflect similar demographics as the non-immersion peers attending the same school. Using the information from the school principal, Figure 2.4 displays the immersion students' demographic at School A.

The DLCI program was implemented with a 'Strand in School' model, also known as a strand program.[7] The strand meant the DLCI program was situated within the English-language mainstream public school. Only 50 students in each grade are in DLCI, so only about 250 students out of the 732-student population are in DLCI. Because of the strand model, there were only ten immersion teachers among the 62 school staff, five native Chinese-speaking teachers, and five English-speaking teachers. English was the primary language used for communication and instruction at School A.

All ten immersion teachers meet highly qualified criteria established by the U.S. DOE and DDOE: Highly qualified; teachers must have: (a) a bachelor's degree, (b) full state certification or licensure, and (c) prove that they know each subject they teach" (U.S. DOE, 2005).

Chinese Language Immersion Professional Development

As the Chinese program was part of the World Language Initiative created by the Delaware Governor and implemented by the DDOE, professional development activities are designed to meet the needs of instructional staff across the State. Three annual learning activities are scheduled to host on-site at the DOE or a location designated by

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[7] A strand program model means a school in which only part of the student population receives dual language immersion education while the majority of the students remains in the traditional program.

the State. Each new Chinese-speaking teacher was assigned an English-speaking mentor with significant teaching experience. First-year teachers also received support from a State instructional coach, a native speaker of Mandarin Chinese.

Program Context: School B

Academic Performance

School B is a top-rated public school located in Washington DC. The school website shows that 569 students were enrolled in grades PK-5 with a student-teacher ratio of 11:1 in the 2018-2019 school year. School B is one of the International Baccalaureate (IB) World schools that adopted the IB curriculum framework. School B serves students ages 3 to 12 and implements IB Primary Years Program (PYP), designed for pre-Kindergarten to fifth-grade learners (more details reported in Appendix F).

According to state assessment data from the Partnership for Assessment of Readiness for College and Careers[8] (PARCC), 57% of students were proficient in math and 56% in reading (PARCC, 2019). The Washington DC Public Charter School Board (PCSB) School Quality Report measured student growth in ELA and math on the PARCC assessment for academic improvement over time. The PARCC assessment indicated a gain of 72.9% in ELA and 71.6% in math (2019-2020 Quality Report, Washington DC Charter School, 2020).

School B was the top-performing school for nine consecutive years, meeting every academic and nonacademic performance target set by the DC PCSB between 2011

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[8] The Partnership for Assessment of Readiness for College and Careers, or PARCC, is the District of Columbia's annual assessment of mathematics and ELA/literacy for students in grades 3 through 8, based on the Common Core State Standards (CCS). Students take the assessment online each spring.

and 2020. Each year, the school received a 5-star rating[9] by the Washington DC school accountability system of the School Transparency and Reporting Framework. The school was inducted into the National Charter School Hall of Fame in 2018.

Student and Staff

School B, which is located in Ward 5 of Washington, D.C., is open to all children in the city's eight wards.[10] Approximately 67% of enrolled students are from Ward 4 and Ward 5. According to U.S. Census Bureau's 2010 data, 59% of children in Ward 4 and 76% of children in Ward 5 were African American. One of the strengths of School B might be community diversity, which helps increase cross-cultural and ethnic awareness. Student demographics are illustrated in Figure 2.5 according to the PCSB Quality Report (2019, p.1). In addition, about 14% of students had disabilities, and 11.1% were English language learners (ELL).

Figure 2.5

School B: Student Demographics (Enrollment by Race and Ethnicity 2018-2019)

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[9] Each school receives a rating of 1 to 5 stars, with 5 being the highest, based on its performance across multiple metrics.

[10] Washington DC is subdivided into smaller governmental units and these units are called wards. The city has eight of them.

American Indian/Alaskan
Asian
Black/African American
Hawaiian/Pacific Islander
Hispanic/Latino, any race
Two or More Races
White
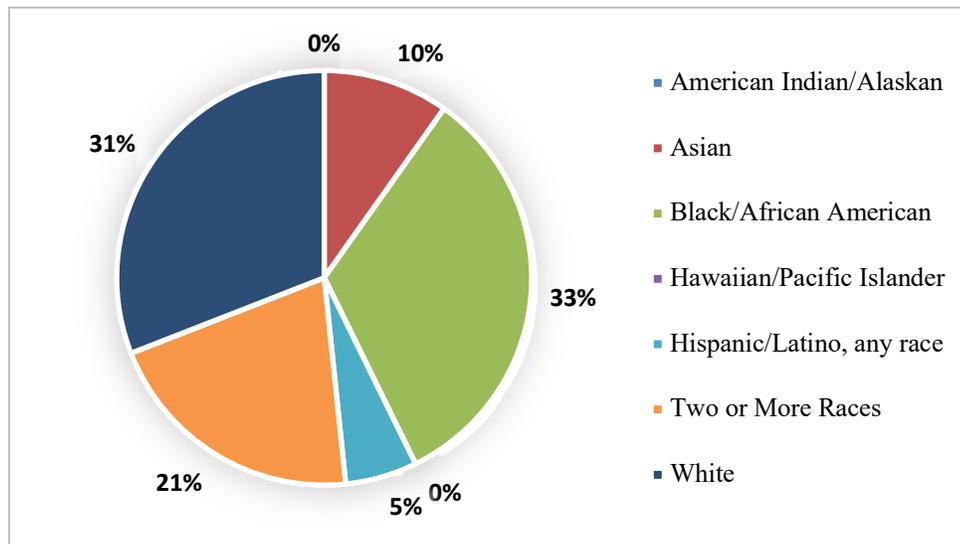
Note: Reprinted from the 2018-2019 School B quality report by DC Public Charter School Board. Source :
https://dcpcsb.org/sites/default/files/media/file/PMF%20Score%20Card%20SY18-19%20-%20Washington%20Yu%20Ying%20PCS.pdf

School B has a high student retention rate and is in high demand. For example, there is a waiting list of 855 applicants for the 2021-2022 school year. According to the data provided by the PCSB (2021), more than 97% of students re-enrolled each year. In the 2018-2019 school year, School B received more than 1600 applications for only 91 available seats and total school enrollment was 598 students (PCSB, 2021).

According to the school's immersion coordinator, there are 120 school staff in the current school year at School B, including the administrative team, student support staff, learning support teachers, interventionists, and reading specialists. Using information from the school immersion coordinator, Table 2.1 displays the instructional staff member allocation in each grade, including the number of classes and students across the school.

Table 2.1

School B Instructional Staff Assignment

Grade	Number of classes	Students per class	Total students per grade	Chinese-speaking teachers	English speaking teachers	Teaching assistants (Chinese)	Emotional support staff	Learning support staff (Chinese)	Learning support staff (English)	Interventionist (English)
Pre-K3	4	16	64	4	0	4	1 (Chinese-speaking)	3 (For all grades)	7 (For all grades)	5 (For all grades)
Pre-K4	5	20	100	5	0	5				
K	4	20	80	4	2	4 bilinguals				
1st	4	20	80	4	2	0				
2nd	4	20	80	2	2	0	1 (English-speaking)			
3rd	4	19	76	2	2	0				
4th	4	16	64	2	2	0				
5th	3	18	54	2	2	0				
Total:	32		598	25	12	13	2	3	7	5

School B Chinese Language Immersion Program

School B was established in 2008 by a group of parents to offer Mandarin Chinese language immersion instruction. It was the first and only public school to offer Chinese language immersion in Washington, D.C. at the time. The school was founded on the belief that bilingualism developed a significant ability to understand and communicate with other cultures and position students to succeed professionally in an increasingly globalized world economy.

The Chinese Immersion program at School B is a whole-school model, serving the entire student population of 598 children from pre-Kindergarten through fifth grade. Although the instructional language immersion model for students from Kindergarten through grade five is a 50/50 model, the pre-Kindergarten (3 and 4 years of age) and K-grade receive 100% instruction in all subjects in the Chinese language every school day. The following excerpt highlights the preliteracy and early literacy development plan:

> From kindergarten on, students develop understanding through direct instruction of
> basic early literacy skills in English: phonemic awareness, and in both English and

Chinese: phonics, sight word acquisition, fluency, and comprehension. Prior to kindergarten, there was an international focus on a literacy rich environment, oral language development in Chinese, and early literacy skills in Chinese: phonemic awareness (2019-2020 School B Annual Report, p. 8).

Students are taught in both Chinese and English for all subjects all day, including arts and physical education. A significant difference between School A in Delaware and School B in Washington DC is that the latter changes the language of instruction daily, rather than switching languages in the middle of a school day as in the Delaware model.

Instructors collaborate within and across grade levels to provide vertical and horizontal articulation of the curriculum throughout the school. The Chinese curriculum follows the PYP curriculum but in the Chinese language. Grade-level teaching teams of Chinese and English teachers met daily to coordinate lesson plans, as each lesson built upon the lessons taught the day prior, regardless of the language of instruction. The daily co-planning sessions were built into the teachers' daily schedules. Using the daily teaching schedule provided by the school immersion coordinator, Figure 2.6 illustrates the two languages used daily in School B.

Figure 2.6

School B: Subjects Taught in both languages
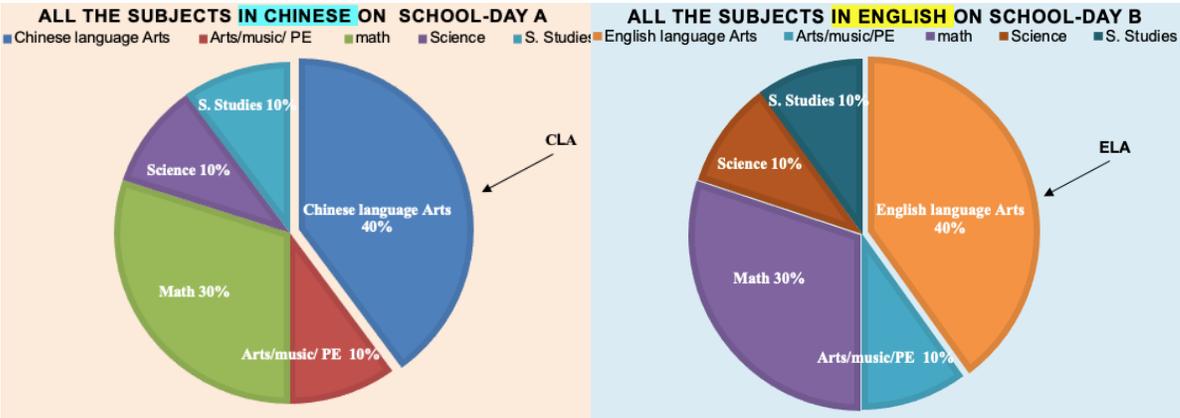
School B also offered students and families before- and after-school programs. The after-school program provides enrichment classes, such as sports, STEM, arts, and creative writing. Over the years, courses taught in Mandarin included Chinese Martial Arts, Chinese Dance, Chinese Songs, Chinese Culture, and Chinese Homework (e.g., study club).

Problem Statement

This section elaborates upon the issues in Chinese immersion programs, answering questions such as whether the students' Chinese literacy trajectories differ with different instruction designs. Students' achievement data for the two programs were collected and analyzed to determine whether the instruction design affected their Chinese literacy development and achieving program biliteracy goals. The importance of intervention is also discussed, as well as a strategy to ensure healthy program growth and evolution.

As summarized by Garcia (2009) and Genesee (2004), language immersion programs are for students to (a) develop bilingualism (the ability to speak fluently in two languages) and develop biliteracy (the ability to read and write in two languages); (b) demonstrate high levels of academic achievement; and (c) develop cross-cultural competence (appreciation for and understanding of diverse cultures) (Garcia, 2009; Genesee, 2004). However, the DLCI program experienced challenges in achieving its program goals, including having too few students gain in Chinese literacy proficiency, although more than 80% of the students reached the benchmark for ELA, outperforming their non-immersion peers.

Despite the academic success and growing popularity of language immersion programs, they do not come without challenges. Primary among them are documented deficiencies in the target language literacy proficiency acquired by immersion students (Cammarata & Tedick, 2012). Similar deficiencies were also found within DLCI programs. Based on the 2018-2019 report on accountability assessment by DOE, Figure 2.7 illustrates fifth-grade Chinese immersion students' performance data at School A.

Figure 2.7

School A: Academic Achievement on CLA and ELA

Academic Report (2018-2019)
School A: 5th Grade Chinese Immersion Students

CLA: Chinese Language Arts ELA: English Language Arts
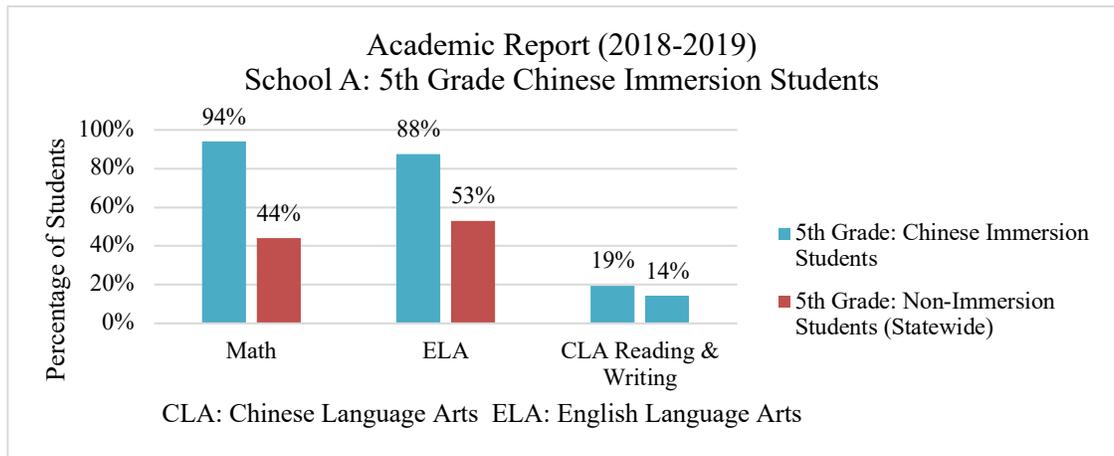
By program design, at least 80% of the immersion learners should reach grade-level proficiency in both Chinese and English by fifth grade. Immersion learners achieved the established benchmark for ELA in 2018-2019 as more than 85% of students reached or exceeded grade-level proficiency. However, less than 20% of the immersion learners in the same group reached grade-level proficiency in Chinese reading and writing. Thus, the biliteracy goal was not reached.

Biliteracy refers to either bilingual or multilingual literacy, and the term refers to both (Gentil, 2011; Hornberger & Link, 2012). Biliteracy is the ability to read, write, and speak two languages simultaneously (Hu & Commeyras, 2008; Babino, 2017). Biliteracy in this ELP is defined as being literate in both Chinese and English. Literacy in the two languages means that students can read, write, and speak both languages. Additionally, students are able to adapt to different social contexts or situations culturally and linguistically in both languages.

According to Lindholm-Leary (2005), a key element of successful language immersion programs is ensuring a commitment to robust target language development, mainly using the target language in early literacy instruction (Cloud et al., 2000). Collier and Thomas (2004) noted that most 50/50 model programs provided a 90/10 split instruction format in the initial grades (pre-Kindergarten through first-grade) with 90% of the time in the target language and 10% in English to develop preliteracy skills. The two program languages are equally used to a 50/50 model by fifth grade.

As aforementioned, School B adopted a model providing 100% instruction exclusively in Chinese from pre-Kindergarten through first grade. English instruction gradually increased from grade two and reached 50/50 split in Chinese and English by fifth grade. School A, in contrast, used the 50/50 instructional model in all grade levels, Kindergarten through the fifth grade, without a 90/10 component for preliteracy development.

In a 90/10 dual language education program, students in pre-Kindergarten through first grade receive 90% of their instruction each day in the target language to develop an early literacy foundation to ensure biliteracy in later grades. The ratio of instruction time

24

for each language was considered a critical factor for ensuring the success of immersion education in achieving biliteracy. An additional variable identified by Howard et al. (2018) suggests early-stage immersion programs should emphasize the target language in order to counteract the priority given to the dominant language. As noted by Lindholm-Leary (2012), despite dual language immersion programs' stated goal of biliteracy, students are rarely held accountable for demonstrating grade-level literacy skills in a non-English language.

In a similar case with the DLCI programs, Chinese literacy assessment was merely recommended but not required unlike other subjects, including ELA, mathematics, social studies, and science. The absence of CLA on student report cards inherently implies to the community and parents that Chinese literacy is not as important as ELA. Several studies indicated that a language perceived to have less importance in a society is a language likely to be lost (Pease-Alvarez, 1993; Portes & Hao, 1998; Veltman, 1988).

In Chinese immersion language programs, students are required to be biliterate in Chinese and English, but a very small number of students in DLCI reached grade-level Chinese literacy proficiency. As academic rigor increases, low Chinese literacy proficiency hinders student academic success regarding their understanding of subject area content. Thus, increasing Chinese literacy proficiency is paramount for students to achieve Chinese and English biliteracy and ensure program success.

In response to the documented deficiencies in Chinese literacy, the purpose of this ELP is twofold:

a) to establish program contexts of the two-immersion program, while exploring and examining the features of the instruction design used; and

b) to assess the extent to which Chinese literacy assessment data differs in the two settings with regard to the target population of learners as described herein.

The findings of this study may be beneficial to Delaware immersion students and serve as a resource for the development of future Chinese immersion programs. The research identified deficiencies in the non-English language proficiency widespread in immersion education. The current study results may further enlighten action plans for addressing similar challenges facing programs elsewhere.

Chapter 3

IMPROVEMENT GOALS AND STRATEGIES

The overarching goal of the ELP was to improve Chinese literacy proficiency. Understanding the problem and diagnosing its underlying causes was crucial before attempting to solve it. As emphasized by Freeman (1988), each program had to be examined to identify factors that contributed to its effectiveness because language immersion programs were designed and implemented differently according to the context of the program. Additionally, among the various factors, administrative support, instruction design, and the school environment were essential criteria for successful immersion language programs (Lindholm-Leary, 2001).

For this ELP, the focus was on the instruction design of the two programs.

Research Design

This ELP employed a descriptive case study method. According to Stake (1995), the case study was relevant to the inquiry. The purpose of a case study was to build knowledge and provide an understanding of the problem for the audience and researcher.

In light of this ELP's two improvement goals, this descriptive case study allowed for opportunities to gather data on similarities and differences across the two schools involved. Analyzing these similarities and differences could identify the factors that support or detract from achieving biliteracy.

A contextual profile of each program was compiled including the different instruction designs implemented in order to determine whether they contribute to or hinder biliteracy development. The quantitative assessment data were collected to investigate whether the instruction design affected learning outcomes in Chinese literacy.

In order to increase Chinese literacy proficiency, the case study aimed to address two immediate goals or strategies:

Goal 1: Establish contextual profiles of two one-way Chinese immersion programs to examine how instruction design affected the development of Chinese literacy.

Goal 2: Collect and analyze longitudinal quantitative student achievement data of the two programs to prove the hypothesis that instruction design is correlated with students' learning outcomes.

Participants

The case study used purposive sampling to recruit teachers for the voluntary survey at the two schools selected for the ELP. To protect participants' anonymity, the coordinator at each program site distributed the survey link instead of the researcher of this ELP. A teacher survey provided data to address Goal 1, and student achievement data (de-identified) provided data to address Goal 2.

Goal 1: Teacher-participants responded to a survey questionnaire. An estimated of 50 teachers from both schools was expected to participate in the survey. The survey aimed to collect contextual information on the ratio of the two program languages used in daily instruction, the committed instruction time for Chinese and English, Chinese teaching materials, Chinese literacy strategies, and professional development (PD) for Chinese literacy instruction.

Goal 2: Quantitative achievement data reflecting the cohort of students in Chinese immersion programs at each program site during third through fifth grades was gathered (n>90), during which assessment data were available. This data enabled a comprehensive description of student achievements over three years. The longitudinal trajectories in

Chinese literacy development in each of the three grades were described and illustrated with graphs of gathered data.

Research Instrument

The survey instrument was designed to be completed online within five to eight minutes. The survey questionnaire was developed with Qualtrics software combining multiple-choice questions, Likert scale items, and open-ended questions. The neutral option was eliminated from the Likert scaled response options (e.g., neither agree nor disagree), as it would not generally yield meaningful results to support this survey's objective. Since the survey intended to collect contextual information for each program, including program staff's view on instructional materials or curriculum, clear answers of 'agree' or 'disagree' helped gather the information needed.

Quantitative Assessment Data

English Language Arts Assessment

The Delaware state accountability assessment used at School A is the Smarter Balanced Summative Assessment, which is aligned with the Common Core State Standards (CCSS) for ELA and mathematics. This assessment is utilized during April and May of each school year to evaluate student achievement in grades three through eight. The state accountability assessment adopted by School B was the Partnership for Assessment of Readiness for College and Careers (PARCC), also aligned with CCSS, utilized in the spring of each school year to evaluate grades three through eight. Each assessment tool is regarded as a standardized test, a well-regarded source for collecting data on student academic performance. Test scores will be collected for analysis during three consecutive school years (2016-2017, 2017-2018, and 2018-2019) at each school.

Chinese Language Arts Assessment

School A uses the assessment designed by the American Council on the Teaching of Foreign Languages (ACTFL) for the Chinese literacy summative test. ACTFL describes the test as the ACTFL Assessment of Performance toward Proficiency in Languages (AAPPL), an assessment of standards-based language learning across the three modes of communication (interpersonal, presentational, and interpretive) defined by the National Standards for Foreign Language Learning.

School B uses the Standards-based Measurement of Proficiency (STAMP) by Avant Assessment LLC to measure the four language skills: listening, speaking, reading and writing.

Data Analysis Plan

The survey results are generated via Qualtrics. The results are presented in various forms of graphs or tables either to show frequencies or measures of tendency (mean, median, or mode) according to the type of survey questions. For instance, with Likert scale data, the most appropriate statistic might be *the mode*, the most frequent responses among 'strongly disagree, disagree, agree, strongly agree,' because *the mean* or average would not be logically meaningful in this case. On the other hand, for the category type question, such as 'years of teaching,' the *mean to measure the ratio level of* the frequency of responses using percentage would be appropriate. A bar or pie chart would be an excellent visual to illustrate the results.

The purpose of assessment data analysis is to examine student biliteracy performance over the three school years (2017-2019). The achievement data of each group were investigated and statistical tools were used to prove whether the instruction

design affected their learning outcomes in Chinese literacy. The percentage of students who reached grade-level benchmarks in Chinese and English in each grade is determined using descriptive statistics. Additional statistical tools were used to test whether there were any significant differences in students' assessment results between the two programs.

Planned Use of Findings

It is my hope that the findings will illuminate the vital role of the instructional model in program design as it relates to the goal of biliteracy development. Based on the findings, a recommended instruction design was proposed to improve Chinese literacy proficiency. The study findings and recommendations will be shared with the district stakeholders as well as the public. Currently, very little research on effective instruction design is available for one-way Chinese immersion programs, so the case study findings could be helpful in designing instruction for any future Chinese immersion programs. Furthermore, the results could be used by stakeholders to inform their decision-making regarding how well the adopted instruction design facilitated students' progress toward biliteracy. It is my hope that the findings of this study could provide plausible pathways for achieving the goal of sustainable biliteracy through language immersion.

Chapter 4

IMPROVEMENT STRATEGIES RESULTS

This case study aims to investigate whether the two different instructional approaches result in different Chinese literacy learning outcomes and whether the instruction model contributed to the differences.

A teacher survey was conducted to gather data on similarities and differences in the contextual conditions of the two Chinese immersion programs. The analysis of biliteracy data was conducted to determine whether the instruction design affected the learning outcomes. Both results are reported in the following section.

Teacher survey results

Summary of Teacher Survey

A detailed analysis of the teacher survey can be found in Appendix F. Thirty-two teachers from both schools participated, representing 64% of the anticipated fifty teachers. Seventeen of the thirty-two were from School A, and fifteen were from School B. About 69% of the participants were Chinese teachers, including one school administrator in School B, and the remaining 31% were immersion program English teachers. The survey completion rate was 71% with 32 respondents answering 100% of the twenty-two questions. The other 29% (nine respondents) answered between 60% and 91% of the questions.

Similarities

The survey results reflected similarities between the two schools in the following areas:

- Teacher education background;
- Teachers' teaching experience;
- Chinese literacy materials;
- Chinese literacy instruction strategies.

Below are the results for each category listed above.

Teacher Education Background

Survey responses indicate that the teacher's education levels were very similar between the two schools. In Figure 4.1, the bar chart illustrates the distribution of the participants' educational backgrounds by the school. There were seventeen participants from School A and fifteen from School B.

Figure 4.1

An overview of teachers' education level at Schools A & B
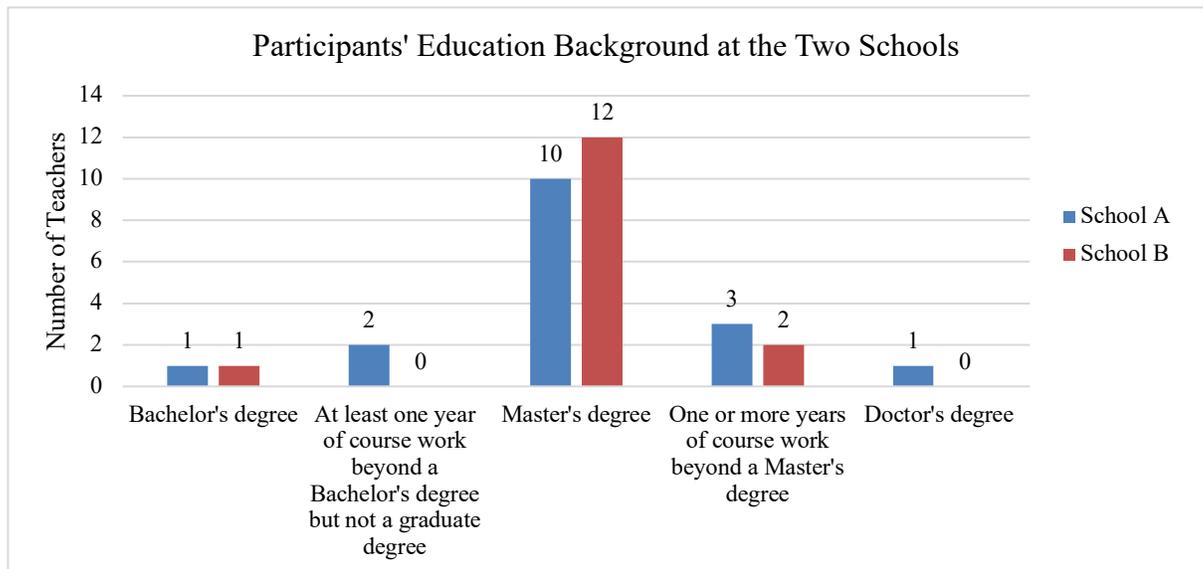
Both schools had an equal number of teachers with master's degrees or higher: fourteen in School A, one with a doctorate, and fourteen in School B (Figure 4.1). Each school had about 83% representation with a master's degree. There was only one teacher from each school with a bachelor's degree instead of a master's.

Teaching Experience

In Figure 4.2, participants' teaching experiences in both schools are summarized.

Figure 4.2

Teaching experience of the participants from Schools A & B
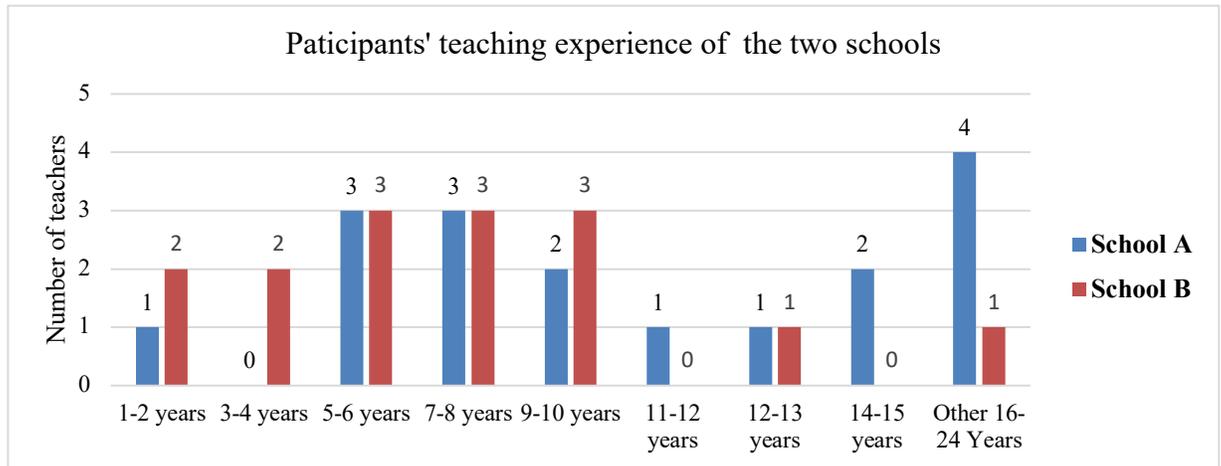
School A reported that sixteen out of seventeen participants (94%) taught for approximately five to twenty-four years. Only one participant had less than five years' experience. School B reported that eleven of the fifteen participants (73%) of the survey participants taught for five to seventeen years, while the other four had less than five years of teaching experience.

Due to the study's focus on Chinese immersion programs, it is important to note the average number of years Chinese teachers had taught compared to their English teaching partners. Thus, I separated the survey results of the two groups.
Results showed that English teachers at both schools have more years of teaching experience than Chinese teachers. English teachers in School A had seventeen years of teaching on average, while Chinese teachers had eight years on average. The differences

are comparatively less pronounced at School B, where English teachers averaged about eight years' experience, while Chinese teachers averaged about seven years' experience.

Chinese Literacy Materials

In School A, the Chinese literacy materials were selected by the state DOE, while in School B, it was decided by the instruction team at each grade. Even though different sources of personnel decided on the Chinese literacy curriculum materials in the two schools, there appeared to be little difference in the mid-range of satisfaction levels between the two groups. There were four options on the Likert scale to measure satisfaction level: 'Strongly agree,' 'Somewhat agree,' 'Somewhat disagree,' and 'Strongly disagree.' Figure 4.3 below shows how Schools A and B responded to the statement regarding the effectiveness of literacy materials selected.

Figure 4.3

School A and B response to the Chinese literacy materials' effectiveness in developing literacy
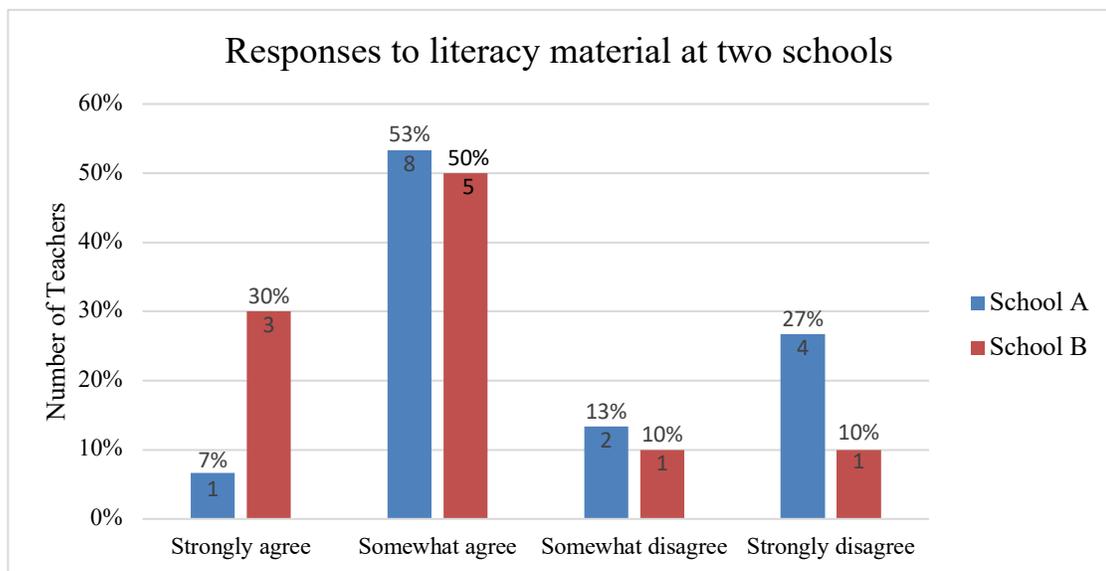
As for the 'somewhat agree' response, there wasn't much difference between 53% from

School A and 50% from School B. However, there was a large difference (7% vs. 30%)

between the 'strongly agree' and 'strongly disagree' between the two schools. The

strongly agreed number from School B was higher at 30%, while School A showed only

7%. Consequently, School B's 'strongly disagree' rating was only 10%, far lower than

School A's 27%.

Since literacy materials are regarded as one of the critical factors for literacy

development, it was important to validate whether there were any significant differences

between the two groups. Therefore, a T-test was conducted to determine whether the

satisfaction levels of the two groups were statistically different. T-test results indicate that

"no significant differences" were found.

Chinese Literacy Instruction Strategies

Regarding instructional strategies in the survey, the participants were asked to indicate on

a 1-5 scale on the nine instructional practices used in the CLA classroom. The nine

instructional practices are as follows:

- Provide context clues to students to help them understand the material;
- Connect with students' real-life experiences;
- Reading Chinese text aloud to help with recognition;[11]
- Have students read aloud for fluency of pronunciation;
- Reading aloud improves students' reading fluency;
- Teach students to identify Chinese characters based on their radicals;
- Pinyin, tones, and radicals are practiced in class;

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[11] Chinese is the only logographic writing system still in use. Radical is the base component of each character. Pinyin is the phonetic system in Chinese, a linguistic tool used to type Chinese characters in the Latin alphabet. This aids both with reading Chinese and its pronunciation.

- Use characters to make sentences or phrases to demonstrate students' understanding
- Use the teaching materials to prompt students to act out what they've read.

The survey results (Appendix F) indicate some variations in teachers' responses to the listed strategies used between Schools A and B. As for literacy instruction practices that play an essential role in literacy learning outcomes, an ANOVA test was carried out to evaluate if significant differences existed between the two groups. The ANOVA results indicated no significant difference between the two groups from School A and School B since the F-value was smaller than 1, and the p-value was greater than .05.

Differences Reflected in the Instruction Design

Despite both schools adopting a 50/50 immersion model, there is a great deal of variation in the languages used for instruction and the time each language is used since it can be divided in various ways: half day and half day, one language per day, switch on an alternate day, or even alternate weeks.

In the survey data, some differences in instruction design can be seen from participant responses to the following questions:

- How are the two languages (Chinese and English) used in the instruction to teach school subjects at the grade level you teach?';
- How many minutes per day are scheduled for teaching Chinese language arts at the grade level you teach? (English teachers may skip).

Based on the survey responses, Table 4.1 below illustrates how the two languages are used to teach academic subjects in School A and School B.

Table 4.1

Two language allocation in teaching school subjects between School A and School B

School A	2017 –2019 Chinese Immersion Instruction Model				
Grade level	Math 1.Chinese 2.Both 3.English	Science 1.Chinese 2.Both 3.English	Social Studies 1.Chinese 2.Both 3.English	Specials [1] 1.Chinese 2.Both 3.English	Two-language switch
K-grade	1	1	3	3	Mid-day
1st grade	1	1	3	3	Mid-day
2nd grade	1	1	3	3	Mid-day
3rd grade	1	1	3	3	Mid-day
4th grade	1	1	3	3	Mid-day
5th grade	1	1	3	3	Mid-day

School B	2017 –2019 Chinese Immersion Instruction Model				
Grade level	Math 1.Chinese 2.Both 3.English	Science 1.Chinese 2.Both 3.English	Social Studies 1.Chinese 2.Both 3.English	Specials [1] 1.Chinese 2.Both 3.English	Two-language switch
Pre-k 3	1	1	1	3	n/a
Pre-k 4	1	1	1	3	n/a
K-grade	2.Both	2.Both	2.Both	3	Daily [2]
1st grade	2.Both	2.Both	2.Both	3	Daily
2nd grade	2.Both	2.Both	2.Both	3	Daily
3rd grade	2.Both	2.Both	2.Both	3	Daily
4th grade	2.Both	2.Both	2.Both	3	Daily
5th grade	2.Both	2.Both	2.Both	3	Daily

Note. [1] Specials include arts, music, library media, SEL & PE

[2] Half day on Fridays and two languages alternate every two weeks.

As shown in Table 4.1, all special classes were taught in English at both schools. In School A, math and science were conducted in Chinese and social studies was taught in English. The two languages switched in the middle of the school day. In other words, if math and science were taught in Chinese in the morning, then this group would switch to English instruction for ELA in the afternoon, including 10-15% of instruction time in English for math and science bridge lessons.

In contrast, a total immersion of 100% Chinese was implemented for pre-k students, who were three- and four-years-old, in School B. From Kindergarten through fifth grade, academic subjects of math, science, and social studies were taught in both languages, and the two languages switched every other day. In other words, if students received instruction in Chinese on A Day, all the subjects were taught in Chinese except

the specials (arts, library media, music, physical education [P.E.], and social emotional learning [SEL]), then the following day, this group of students would receive all instruction time in English for all school subjects, including special classes.

Table 4.2 illustrates how CLA and ELA are scheduled at School A and School B. School B's instruction model enables an equal 110-139 minutes of protected instruction time for CLA and ELA respectively. On the other hand, the School A model provided 20-49 minutes of CLA instruction time per day.

Table 4.2

An overview of the instruction time scheduled to teach CLA between School A and School B

School A-Instruction time scheduled to teaching Chinese language arts per day

Grade Level	20-49	50-79	80-109	110-139	140-169	170-199	200-229	Notes
K-grade	√							CLA, math & science are scheduled in half of a school day
1st grade	√							
2nd grade	√							
3rd grade	√							
4th grade	√							
5th grade	√							

School B- Instruction time scheduled to teaching Chinese language arts per day

Grade	20-49	50-79	80-109	110-139	140-169	170-199	200-229	Notes
Pre-k 3 years Pre-k 4 years	All subject contents were taught in Chinese language with CLA oracy-focused							No CLA 'readers' or 'writers' workshop
K-grade	All subject contents were taught in Chinese and English on alternate days with CLA oracy-focused							Same as above
1st grade				√				It is about 40% of the school day for CLA (45-60 min for CLA readers' workshop and 45-60 min for CLA writers' workshop).
2nd grade				√				
3rd grade				√				
4th grade				√				
5th grade				√				

Through the teacher survey, some differences in the instruction design were identified. In the following section, we will investigate the impact of these differences on Chinese

literacy learning outcomes. Data on biliteracy achievement for the two programs is

analyzed to identify contextual factors that might affect learning outcomes.

Achievement Data Analysis

This analysis examined four sets of assessment data from each school: two sets of

CLA data and two sets of ELA data (the full analysis is reported in Appendix E). This

summary reports the positive trajectories in English and slower growth in Chinese. The

differences and similarities in students' learning outcomes were identified and discussed.

Some factors in program contexts could have contributed to the biliteracy development.

Furthermore, the limitations in the findings are discussed to explain the study conditions

and gain a better understanding of the generalized study results.

Summary of the Biliteracy Data Analysis

School A: Assessment Data on English Language Arts (ELA)

Students' ELA assessment results are reported in two primary ways: scaled scores

and achievement levels. The scaled score is the students' overall numeric score,

indicating their current achievement level designed by Smarter Balanced Assessment

Consortium[12](SBAC) (Table 4.3).

Students fall into one of the four achievement levels based on their scaled scores,

as shown in Table 4.3.

Table 4.3

ELA Scale score ranges for four achievement levels of grades 3 through 8

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[12] SBAC is one of two federally funded multistate consortiums designed to develop Common Core-aligned
tests to measure students' progress in ELA and mathematics.

Smarter Balanced ELA	Level 1	Level 2	Level 3	Level 4
Grade 3	<2367	2367-2431	2432-2489	>2489
Grade 4	<2416	2416-2472	2473-2532	>2532
Grade 5	<2442	2442-2501	2502-2581	>2581
Grade 6	<2457	2457-2530	2531-2617	>2617
Grade 7	<2479	2479-2551	2552-2648	>2648
Grade 8	<2487	2487-2566	2567-2667	>2667

Note: Reprinted from Smarter Balanced Organization website. https://validity.smarterbalanced.org/scoring/

The four levels can be described qualitatively in terms of below target (level 1), approaching target (level 2), proficient (level 3), and advanced (level 4).

Figure 4.4 below displays students' average ELA scores in each grade, represented by the blue line. The baseline score for level 4-advanced by SBAC is on the orange line.

Figure 4.4

School A: ELA average scores compare with level 4 target score

School A: ELA Progress over three years
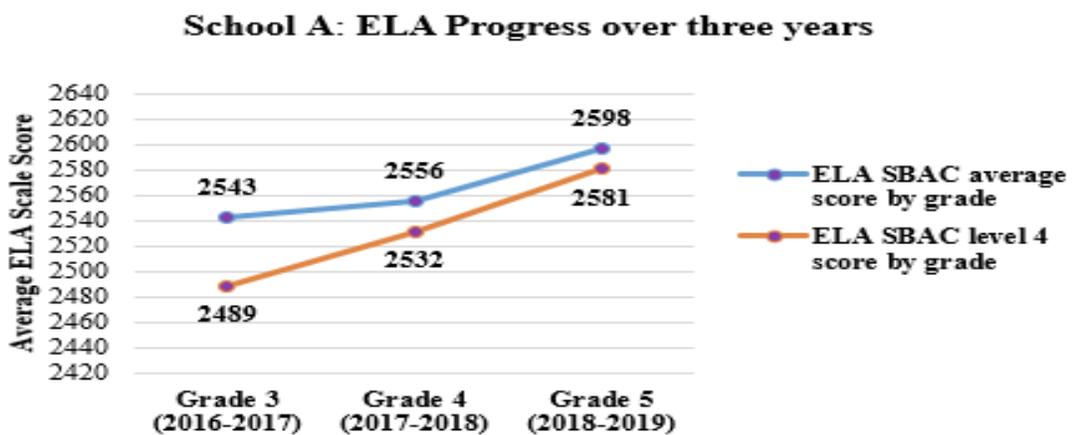
The data in Figure 4.4 shows positive trajectories in ELA growth. The test score of the third graders was 54 points higher than the advanced level 4 baseline score, 24 points higher for the fourth graders, and 17 points for the fifth graders. It might be helpful for program teachers to be aware that the number difference became smaller as the rigor of the curriculum increased. Therefore, the adjustment in literacy instruction might be necessary to match the severity of the curriculum.

The Chinese immersion program in School A operates as a strand within a traditional school model. With a strand model, only a small number of students participate in immersion programs, while the majority are in the monolingual English traditional program, although the immersion program is open to all students. In School A, there were about 40 immersion students in each grade, totaling 200 students from grades one through five. Immersion students represented approximately 28% of the school population of 723 students. The demographics of CI students and non-immersion were not very different. Figure 4.5 displays the demographic characteristics of the two groups of students.

Figure 4.5

Demographic comparison chart of Chinese immersion and non-immersion in School A

School A: Chinese immersion demographics (2017) n=37

- African American — 17%
- American Indian — 0%
- Asian — 17%
- Hispanic — 6%
- Multi-Racial — 9%
- 51%

School A: non-immersion demographics (2017) n=708

- African American — 24%
- American Indian — 0%
- Asian — 6%
- Hispanic — 6%
- Multi-racial — 8%
- 55%
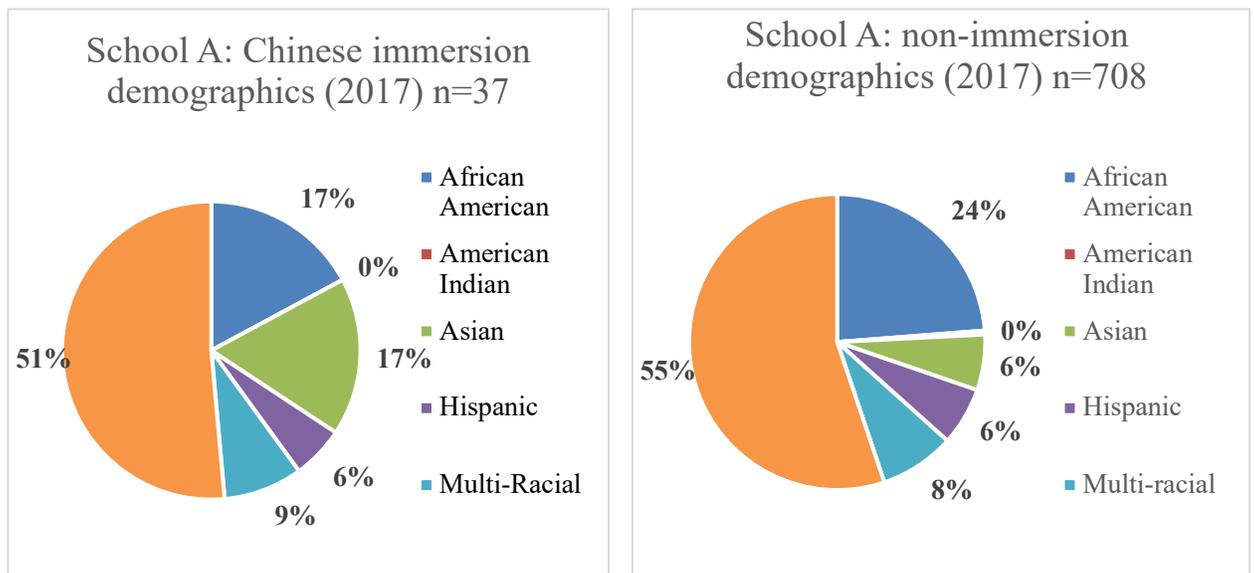
The two pie charts show a similar distribution of most ethnicities except the Asian population. Asians make up 11% more of the CI program population than the non-immersion population. African American students constituted 24% of the non-immersion group, which is 7% higher than the immersion group.

It would be interesting to see how School A immersion students performed in comparison to their non-immersion peers at the same grade level. Figure 4.6 shows immersion students' average scores compared to their peers in the same school and state.

Figure 4.6

An overview of the ELA average scores among three groups from grades three to five

ELA Average scores by school and state over the three grades
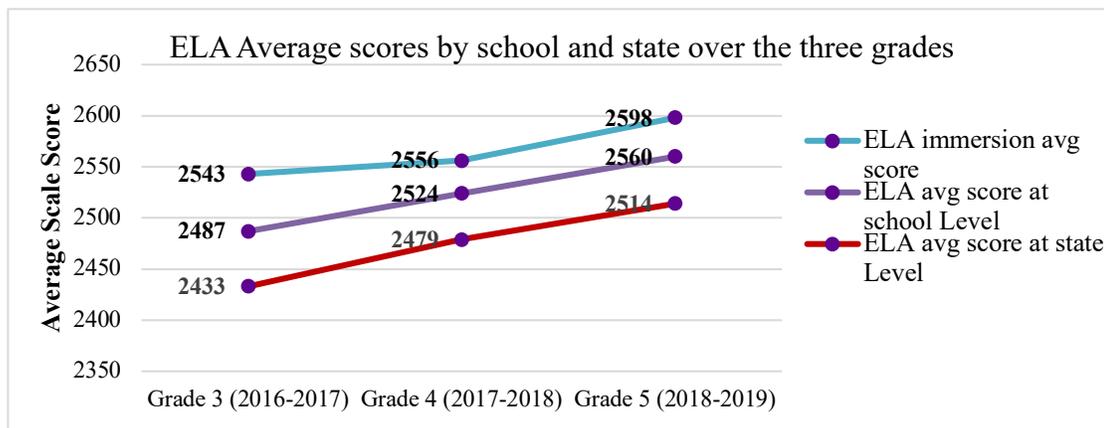
Based on the DDOE's published data, Figure 4.6 displays an overview of the average ELA scores for three groups of students: the blue line represents immersion students, the purple line represents students in the same school, and the red represents the students statewide. Immersion students' overall average scores in grades three through five were 42 points higher than their peers' school-wide and 90 points higher than their peers statewide.

In order to establish whether immersion students (n=104) and non-immersion students (n=368) had significantly different ELA scores, a two-sample T-test was performed on the two groups. The p value <.003 indicated there is a significant difference between the two groups. Thus, it can be concluded that immersion students outperformed their non-immersion peers in ELA at School A. However, a T-test between immersion students and their non-immersion peers statewide was not conducted because individual ELA data on a statewide level was not available publicly.

As emphasized earlier, biliteracy is one of the primary goals of language immersion education. The ELA data sufficiently clarified that CI learners met their grade-level expectations in English. This represents proficiency markers in ELA and

provides benchmark information for reviewing and analyzing CLA assessment data regarding biliteracy.

School A: Assessment Data on Chinese Language Arts (CLA)

CLA proficiency was assessed by the Assessment of Performance toward Proficiency in Languages (AAPPL). The AAPPL was designed by the American Council on the Teaching of Foreign Languages (ACTFL) to measure students' language skills of listening, speaking, reading and writing.

The AAPPL is comprised of four components and assesses the following four skills:

- Interpretive Listening (IL),
- Interpretive Reading (IR),
- Interpersonal Listening/Speaking (ILS),
- Presentational Writing (PW) (ACTFL n.d.).

AAPPL Scores range from N-1 (low range of Novice) through A-1 (the beginning of the Advanced range). Table 4.4 illustrates how the AAPPL Proficiency and Performance Scores align with the ACTFL Proficiency Scale (LTI n.d.)

Table 4.4

AAPPL performance scale and score range

ACTFL Proficiency Scale	ACTFL Performance Range	AAPPL Proficiency Range & Performance Score
Advanced Low	ADVANCED	A-1
Intermediate High		I-5
Intermediate Mid		I-4
Intermediate Mid	INTERMEDIATE	I-3
Intermediate Mid		I-2
Intermediate Low		I-1
Novice High		N-4
Novice Mid		N-3
Novice Mid	NOVICE	N-2
Novice Low		N-1

Note. Reprinted from ACTFL (n.d.) *Scores and reporting.*
https://www.actfl.org/center-assessment-research-and-development/actfl-assessments/actfl-k-12-assessments/actfl-assessment-performance-toward-proficiency-languages/scores-reporting

This summary presents data on students' CLA assessments by examining three language skills: speaking, reading, and writing.

The CLA grade level benchmarks are enclosed as Exhibit A. A particular target was set for each of the four language skills (listening, speaking, reading, and writing) based on the attending grade. While listening skills are usually included as part of the assessment, at the time of this study, listening was not offered at School A. The target benchmarks without listening are as follows:

Third grade - Intermediate Low (**speaking**), Novice High (**reading**), Novice High (**writing**)

Fourth grade - Intermediate Low (**speaking**), Intermediate Low (**reading**), Intermediate Low (**writing**)

Fifth grade - Intermediate Mid **(speaking)**, Intermediate Low (**reading**), Intermediate Low (**writing**)

Speaking Assessment

Figure 4.7 illustrates how students performed in the speaking portion of the

AAPPL assessment in grades three (n=33), four (n=37), and five (n=36) over three school

years.

Figure 4.7

School A: Interpersonal Speaking (ILS) proficiency levels from grade three to five
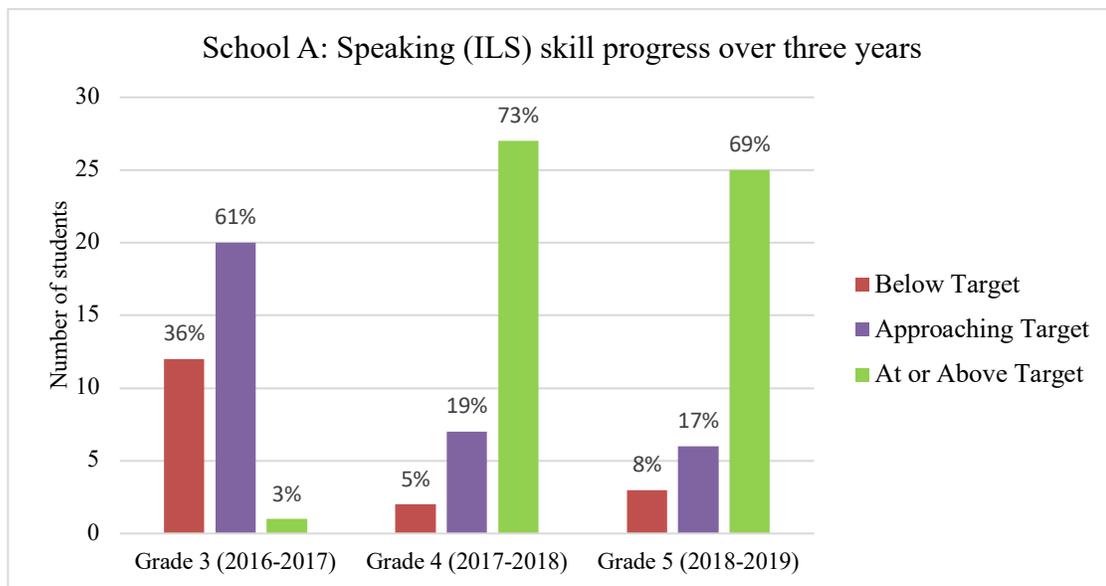
Based on the proficiency target, Figure 4.6 shows what percentage of students at

each grade achieved each of the three achievement levels:

- Below Target,
- Approaching Target,
- At or above the Target.

In 2016-2017, only 3% (one student) reached the target level of Intermediate

Low. The same group performance improved in the following year, 2017-2018, in which

73% (27 students) reached the target benchmark, including ten students who exceeded

the grade level. For the fifth grade, 69% achieved the target: Intermediate Mid. Students

made positive progress in their speaking skills, particularly from third to fourth grade. The percentage of students who performed below target dropped from 36% in third to 5% in fourth grade. By the end of fifth grade, 69% of students were on grade level, although the target percentage should be 80%, as determined by the DDOE.

Reading Assessment

Students in the third grade were not offered reading tests. Therefore, the data is only available for the fourth and fifth grade students.

Figure 4.8 illustrates how students performed in reading across the fourth and fifth grades.

Figure 4.8

School A: An overview of students' progress in reading over 4th and 5th grades (2017 & 2019)
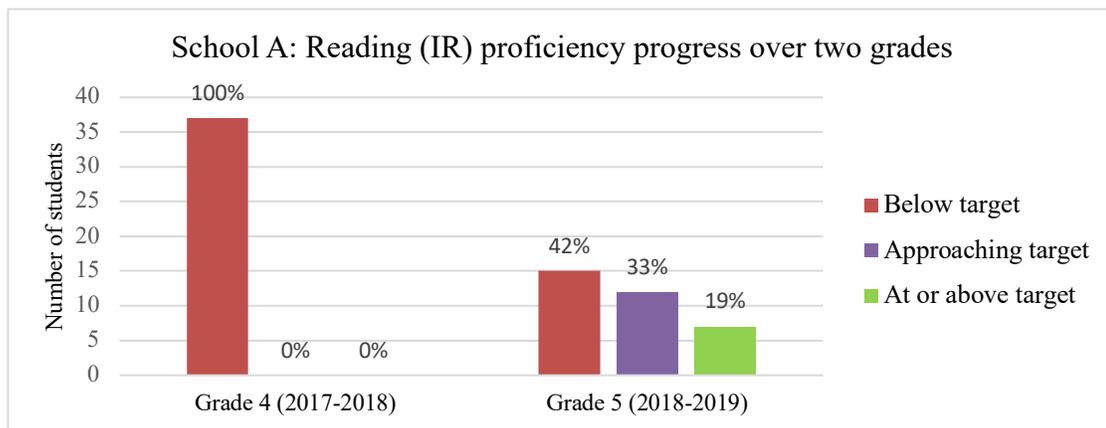
During the 2017-2018 school years, all CI fourth graders scored below the target for reading proficiency (Figure 4.8). In fifth grade, about 19% met the target language proficiency level (Intermedia Low), which was far below the 80% target set by DDOE.

Writing Assessment

The writing assessment was only offered to the fifth graders within this cohort of students who took the speaking and reading assessments in previous years. Figure 4.9 illustrates the writing performance of the thirty-six test-takers in 2018-2019.

Figure 4.9

School A: Students' writing proficiency levels in fifth grade (2018-2019)
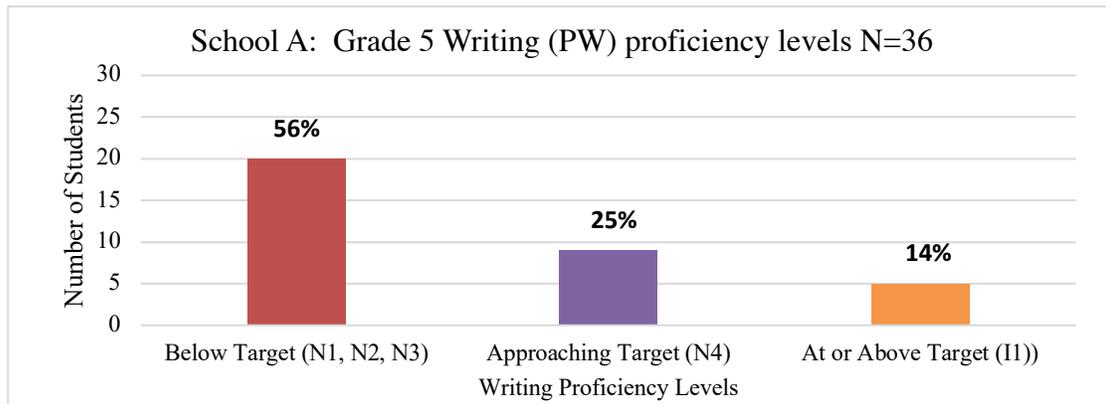
School A: Grade 5 Writing (PW) proficiency levels N=36

More than half of the students (20 of 36) performed below the target. Only five students in the group reached the grade level target of Intermediate Low.

According to AAPPL score descriptors, students at Intermediate Low proficiency use high frequency vocabulary within familiar topics in contexts relevant to themselves and others. Usually, students need visual cues and prior knowledge to comprehend what is being read or heard, although some may be able to communicate in situations that are occasionally unfamiliar (AAPPL Score descriptions, 2020).

Summary of the Assessment data for School A

Based on the SBAC ELA assessment data from third to fifth grades, CI students in School A demonstrated grade-level proficiency in ELA. They are considered at or above the grade level and outperform their non-immersion peers in the same school. In

terms of Chinese language proficiency, not all students met the target levels for proficiency. Nevertheless, compared with the previous year, students made progress in developing three Chinese language skills identified in the AAPPL summative assessment.

Figure 4.10 illustrates the percentage of students who met the grade-level target in CLA and ELA, respectively.

Figure 4.10

School A: An overview of the students who met the target level in CLA and ELA by fifth grade

School A: CLA (n=36)/ELA (n=33) 5th grade
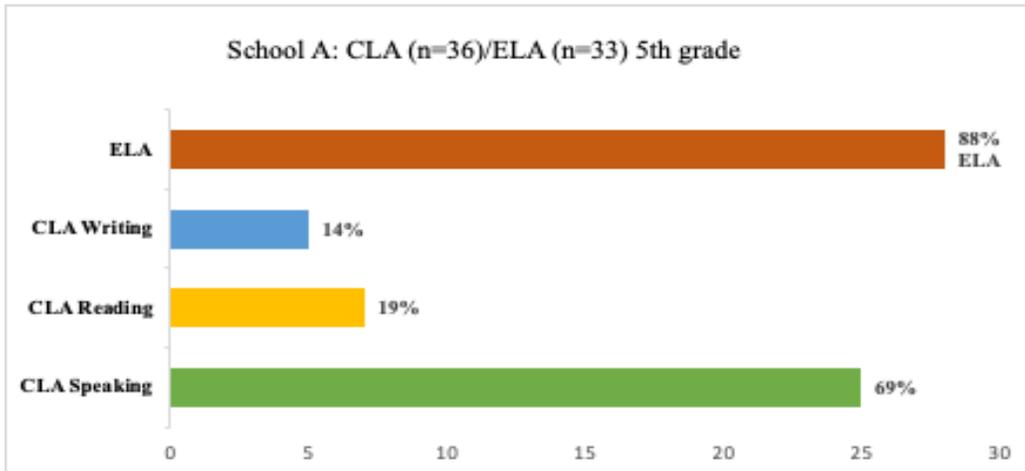
Among the three CLA skills, the strongest is speaking, for 69% of students met the grade level proficiency. The weaker skills are reading and writing (Figure 4.10). However, the percentage of students who met grade level proficiency for speaking (69%) is still below the percentage target established for the CI program, which should be 80%.

The gap between CLA and ELA in Figure 4.10 is evident, and the biliteracy goals were not fully achieved. It is impossible to determine the causes of these results with this data. Possible causes might include contextual factors, such as school program model, curriculum choices, the amount of instruction time dedicated to English and

Chinese literacy (and its various components), student motivation, and perception of the importance of ELA over CLA achievement. Given this data, it seems that the goal of biliteracy remains challenging to reach.

School B: ELA Assessment

Students' ELA (PARCC)[13] assessment results are reported in two primary ways: scaled scores and achievement levels. A scale score is a numerical value that describes a student's performance. A scale score of 750 is the benchmark for college and career readiness on PARCC for reading and mathematics grades three to eight. The PARCC scale scores range from 650 to 850 for all tests (Table 4.5).

Table 4.5

PARCC Scale scores and performance levels
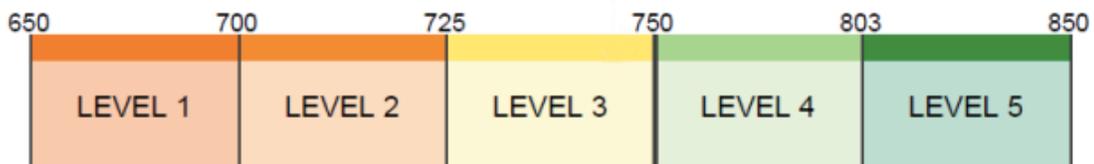
Note. Reprinted from the document "PARCC Scale Scores and Performance Levels."
https://www.montgomeryschoolsmd.org

Each performance level indicates how well students met the expectations for their grade level as described below:

- Level 1 – Did not meet expectations.
- Level 2 – Partially met expectations.
- Level 3 – Approached expectations.
- Level 4 – Met expectations.
- Level 5 – Exceeded expectations (PARCC, 2016).

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[13] PARCC stands for Partnership for the Assessment of Readiness for College and Careers. It is one of two federally funded multistate consortiums designed to develop Common Core-aligned tests to measure students' progress in ELA and mathematics

Figure 4.11 shows how CI students performed in ELA compared to the grade level target.

Figure 4.11

School B: ELA average scores compare with target scores

School B: ELA progress over three years
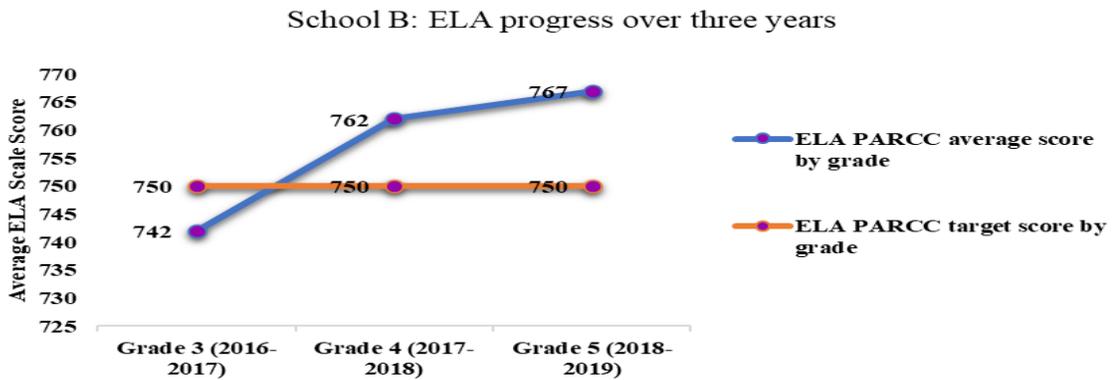
The average score was 742 in the third grade, eight points shy of meeting the benchmark scores. The other two grades achieved scores that were higher than 750. Figure 4.11 shows positive trajectories for ELA across the three grades. The same group of students in the third grade showed slower growth compared with the other two grades.

It is worth noting that students in School B had a total immersion model in Chinese without any English language exposure during pre-k years. It could help explain why third graders' score of 742 is slightly below 750. Nevertheless, the students made adequate positive progress following the third grade and advanced into level 4-meet expectations in grades four and five.

According to the DC Office of the State Superintendent of Education (OSSE), in 2019, 19% more students in School B met or exceeded target scores for ELA on the PARCC assessment as compared to their non-immersion peers in the DC public schools.

School B: CLA Assessment

CLA proficiency in School B was assessed using STAMP.[14] Similar to School A, STAMP uses the same benchmark scale designed by ACTFL.[15] While the names of the two CLA tests differ, both are web-based and measure performance using the same ACTFL benchmarks. Both tests assessed students' language proficiency on four different tasks (listening, speaking, reading, and writing) as evidence of students' language proficiency. The student's language proficiency levels on these two tests could be compatible.

Table 4.6 indicates the three primary proficiency levels, the nine sublevels by ACTFL, and the numeric scores system used by STAMP to refer to the different proficiency levels.

Table 4.6

STAMP benchmark scale correlation with the ACTFL scale

STAMP Level Keys

Reprinted from the Avant Assessment website. https://avantassessment.com/stamp-benchmarks-rubric-guide

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[14] STAMP stands for Standards-based Measurement of Proficiency, created by Avant Assessment LLC.
[15] ACTFL stands for American Council on the Teaching of Foreign Languages.

According to the curriculum coordinator in School B (June 8, 2022), the proficiency benchmarks for the three language skills (speaking, reading, and writing) are as follows:

- Third grade -   Novice high (speaking, reading, writing);
- Fourth grade - Intermediate low (speaking, reading, writing);
- Fifth grade -   Intermediate low (speaking, reading, writing).

Only grade level benchmarks were established for proficiency. No specific benchmarks were established for speaking, reading, and writing.

Each student's score is divided into three proficiency categories: below target, approaching the target, and at or above target.

Figure 4.12 below shows three charts displaying assessment results from grades three to five. The percentage of students in each category is identified in the quantitative term.

Figure 4.12

School B: CLA proficiency levels in speaking, reading, and writing in grades 3 to 5 (2017-2019)

School B: Grade 3 language proficiency levels n=50

School B: Grade 4 language proficiency levels n=72

School B: Grade 5 language proficiency levels n=62
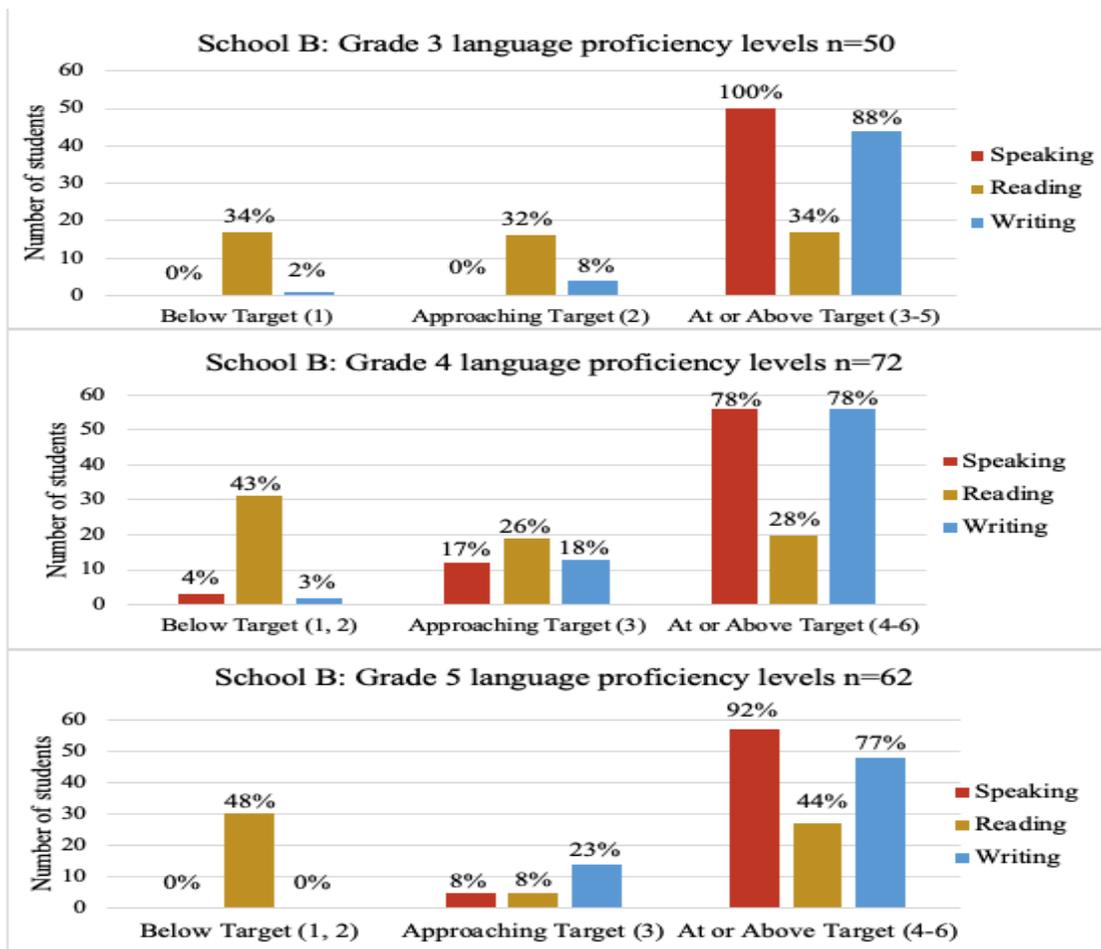
Note. In the 4th grade chart, no scores were recorded for one of the 72 participating students based on the raw data provided by School B.

According to the data specialist at School B, the discrepancy of the number of test taker between 3rd (n=50) and 4th (n=72) grade was due to a group of 3rd graders who participated a special support program and might have not taken the STAMP test.

As shown in Figure 4.12, each language skill was represented by different colors. In the top chart of the third grade, 100% of the fifty students met the speaking proficiency target of Novice High. Only 34% met the novice-high benchmark for reading, while 34% were below target and 32% were approaching target. About 88% of students met the writing benchmark of Novice High.

As shown in Figure 4.12, speaking is the strongest of the three language skills. For speaking, grade level benchmarks were met by 78% of fourth-graders, 92% of fifth-graders, and 100% of third-graders. The second strongest skill was writing, ranging from 77% to 88% who achieved proficiency.

A weaker reading skill was visible across all three grades with 34% of third graders meeting benchmarks, 28% of fourth graders (Intermediate Low), and 44% of fifth graders (Intermediate Low). More than 50% of students across the three grades did not meet the proficiency benchmark in reading.

The target proficiency benchmark for fifth grade was Intermediate Low. About 92% of students achieved Intermediate Low or higher in speaking, 77% in writing, and 44% in reading as measured by STAMP assessments.

According to the Avant Assessment's scoring rubric, it suggested the student who achieves Intermediate Low can understand the main ideas and explicit details in both written and spoken materials related to daily life and familiar topics, and demonstrate the ability to produce simple sentences with enhanced use of adverbs and prepositional phrases (Avant Assessment n.d.).

Discussion

A primary goal of language immersion education is biliteracy, but the extent to which immersion programs achieve biliteracy is often overlooked or overshadowed by the focus on English proficiency (Burkhauser et al., 2016).

The results presented in this summary support the previous research findings that language immersion learners perform on par or even better than non-immersion learners in ELA (Lindholm-Leary and Genesee, 2014, Steel et al., 2017, Watzinger-Tharp et al.,

2018). On the other hand, School B showed better performance in three language skills than School A in CLA.

The findings revealed that the immersion program contexts of instruction design could generate distinctive development trends of biliteracy trajectories. Despite the two-school sharing primary demographics of the program contexts, the students learning outcomes were not identical in the two programs.

Figure 4.13 illustrates how the two schools performed in ELA and CLA by fifth grade.

Figure 4.13

Students' performance in CLA and ELA by grade five in Schools A & B
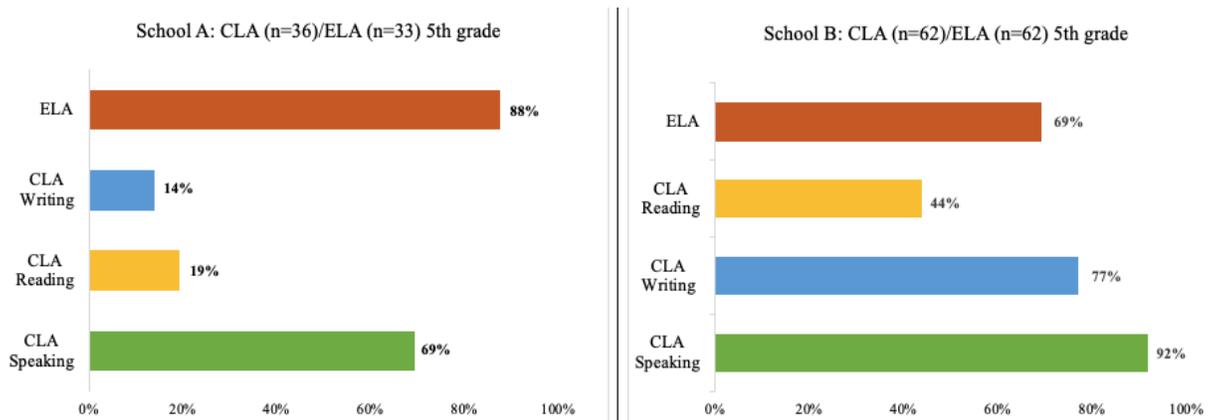
The different learning outcomes presented in the two schools (Figure 4.14) can be attributed to several factors: the structures of using two languages in teaching academic subjects, the protected instruction time dedicated to developing Chinese literacy, early oracy development, literacy materials, literacy instructions, and a strand program in a monolingual school versus a whole school model. Additionally, other invisible factors could influence learning outcomes, such as the leadership's vision for biliteracy, students'

intrinsic motivation, community perception of bilingual graduates, and societal status of a language.

In this discussion, the following factors of program contexts were examined:

- Early Chinese oral literacy;

- Instruction time committed to Chinese literacy development;

- Language transfer between Chinese and English;

- A strand versus whole school program.

Early Chinese Oral Literacy

Due to the relatively new nature of Chinese immersion in the public education system, minimal research has been conducted on early Chinese oral literacy. However, research on bilingual education and alphabetic language immersion is available. The research findings in this study were primarily based on alphabetic immersion target languages.

It was identified in early literacy studies that oral language development is essential for later reading comprehension, as well as phonological awareness in the early years (Spencer et al., 2013). Furthermore, Spencer et al. (2013) asserted that supporting young children's language and literacy development has long been considered a practice that results in strong readers and writers later in life.

Early literacy investment is critical and invested time in oral language development yields high-level literacy skills (National Literacy Institute [NLI], 2009). Notably, non-English partner oral languages positively correlate with reading comprehension, which would be vital to learning the subject matter in language

immersion programs (Geva, 2006). The ability to read Chinese words is strongly

correlated with oral language skills, which could be essential for early reading skill

development. Phonological and morphological awareness skills may also facilitate

reading among older children (Hulme et al., 2019; Lü, 2019).

Concerning Chinese literacy proficiency, the two programs in this case study

implemented different approaches to developing early oral literacy. School A

implemented a 50/50 from Kindergarten through fifth grade while School B adopted a

total immersion of 100% Chinese for early grades in pre-Kindergarten. The previous

research and comparative studies by Lindholm-Leary (2012) and Lindholm-Leary &

Howard (2008) indicate that students demonstrate higher levels of partner language

proficiency when participating in programs with higher levels of partner language

instruction. For example, the 90/10 model (90% time in partner language instruction)

compared to 50/50 programs (50% time in the partner language instruction).

As indicated in School B's Annual Report, prior to Kindergarten, there was an

intentional focus on a literacy-rich environment, oral language development in Chinese,

and early literacy skills in Chinese: phonemic awareness (2019-2020 School B Annual

Report, p. 8). School B's total immersion program in early grades might have played a

role in yielding a higher Chinese literacy proficiency by fifth grade. The objectives of the

total immersion in early grades were Chinese language oracy focused.

The study also indicated that Chinese reading skills were the weakest among the

three skills tested (speaking, reading, and writing). This result was also consistent with

the results reported by Burkhauser et al. (2016). It summarized that reading appeared to

be the weakest skill for Chinese immersion students, but it was the strongest skill among

Spanish immersion students. The researcher further speculated that the different reading proficiency might be closely associated with the level of difficulties in the written form of the partner language and the degree of similarities to their native language English.

The striking differences in speaking, reading, and writing systems between Chinese and English should not be overlooked when addressing Chinese literacy development. Chinese is a tonal language with a pictographic-based character writing system. Compared with alphabetic languages that share the same writing system as English, Chinese character-based text presents a greater challenge for native English-speaking learners. In addition, most of the native English-speaking students were receiving Chinese immersion education for the first time. Therefore, Chinese literacy would take longer for native-English speaker learners to develop than other alphabetic languages. However, learning to read and write in Chinese is not only a challenge for nonnative speakers, it is also true of native Chinese speakers (Met, 2012).

The growing research indicated that learning to read two alphabetic languages, such as Spanish and English, concurrently relied on common phonological processes; thus, these phonological skills can be transferred from one language to the other, and students do not have to be taught from scratch (Met, 2000; Durgunoglu, 2002). Met (2000) further posited that most immersion program models and instruction designs were based on alphabetical languages, including Chinese immersion programs. Clearly, different writing systems between Chinese and English suggest that each must be taught independently. Therefore, a robust infrastructure of instruction design is essential for developing Chinese literacy.

There is also the simple fact that native English learners have been exposed to spoken English and started using the language at home before starting school in pre-K or Kindergarten. Meanwhile, according to a brief survey conducted at the beginning of the K-grade, students entered the Chinese immersion program without any previous exposure to Chinese. As a result of these realities, it was evident that the starting points of learning the two languages were not linguistically equal. English development is approximately four or five years ahead of the Chinese.

Hence, in order to attain biliteracy, there should be greater exposure to Chinese as opposed to English in the early grades. The current 50/50 model for K-5 might not be the most effective approach to meet the needs of the early learners in developing early oracy. Increasing the language exposure time to Chinese in the early grades should be a necessary step to optimize opportunities for early literacy development. Additionally, literacy development starts early in school and is highly correlated with school achievement (Reeder et al., 2017). Given the empirically supported theories behind bilingual education, the finding suggested an early immersion of at least 80% to 100% Chinese is an important, even necessary, component for the success of developing Chinese literacy. However, given the demands for English literacy coverage in the early grades due to state testing requirements, this requirement might not be practically achievable in the current accountability context.

Instruction Time for Chinese Literacy Development

Even though one-way immersion programs differ widely in structure and implementation, certain features are essential. In designing a language immersion instruction model, a key factor is the language of instruction and the ratio of the use of

English to the use of the partner language for instruction (Howard et al., 2018). A key contributor to performance is instruction time, the primary variable between the models and instructional language.

According to the teacher survey results, School A taught CLA for 20-49 minutes per day (for a total of 40-100 minutes over a two-day period), while School B taught CLA for 110-139 minutes over two days (due to School B switching languages on alternate days, 110-139 minutes of CLA were allocated over two days). Figure 4.14 illustrates how the two groups performed in CLA assessments with the different instruction schedules.

Figure 4.14

An overview of the fifth graders' CLA performance in Schools A & B
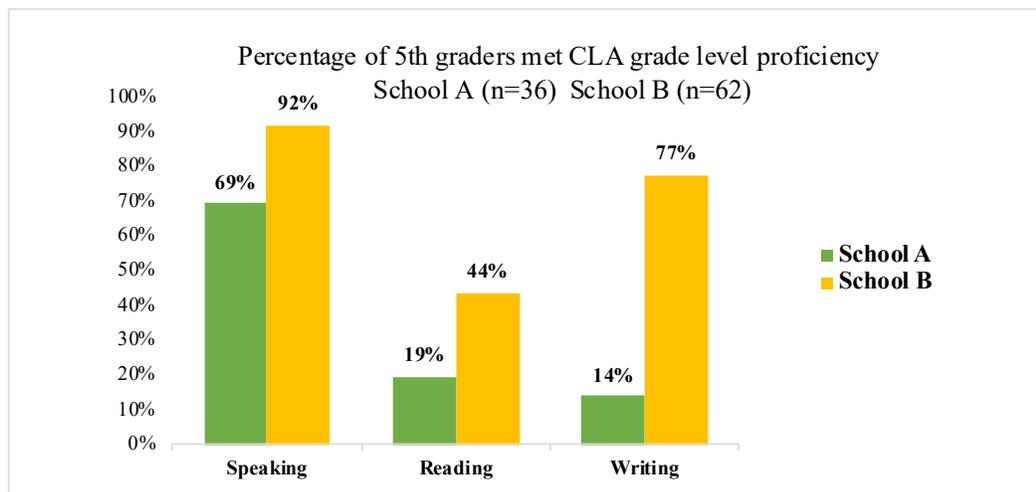
Overall, students from School B performed better than students from School A. The ANOVA test proved the students' performances in the two groups were closely associated with the time invested in Chinese literacy instruction. A sufficient amount of

protected instruction time can lead to a higher Chinese literacy proficiency in students. It appears that the more time invested, the higher the test scores.

This finding can be substantiated by the empirical study of language learning timelines summarized by the Foreign Service Institute (FSI) (n.d.). FSI categorizes Chinese as one of the exceptionally complex languages for native-English learners. Based on more than 70 years of language teaching experience to U. S. diplomats, FSI estimated it takes about 88 weeks (equivalent to 2200 class hours) to reach 'Level 3 proficiency' in Chinese. In contrast, it takes about 24 weeks (600 class hours) to achieve a similar proficiency level for alphabetic languages, such as French, German, Italian, or Spanish (FSI, n.d.). The language guidelines highlight the importance of sufficient time invested in learning Chinese. FSI suggested a learner would need triple the time to learn Chinese compared to learning an alphabetic language to reach a similar level of language proficiency. These data indicate that Chinese instruction should take at least twice as long or longer than alphabetic-based languages.

In reality, most Chinese immersion programs schedule less time for learning Chinese than English, particularly with a strand model within a traditional monolingual English school, which was the case with School A. Furthermore, Lo-Phillip (2014) pointed out that English is the dominant language in the U.S. and was the preferred language for general communication in schools and society. Consequently, a higher value was placed on teaching the English language due to its essential role in U.S. society. The unequal societal value of the two languages may also explain why CLA was scheduled less instruction time despite the necessity for more instruction time due to the complexity

of the Chinese language. The survey results of School A revealed that about 20% of participants desired more time for CLA instruction.

In addition, more recent research shows that immersion students do not produce high levels of academic proficiency from immersion content-based approaches alone, and there is a need for formal instruction in the partner language (Ballinger, 2013; Lyster, 2007; Swain & Lapkin, 2013). These studies suggest that effective instructional strategies are necessary for learners to become fully proficient in Chinese.

Therefore, increasing instruction time in Chinese alone would not substantially improve students' Chinese literacy proficiency. School administrators must integrate effective literacy strategies and best practices in the scheduled professional development or training for anticipated changes.

Language Transfer between Chinese and English

As Kennedy (2019) notes, a well-designed language allocation plan is crucial to achieving biliteracy and immersion program goals. Promoting equity between the two languages and supporting program goals, instruction is systematically assigned in each language and across content areas. Thus, Chinese immersion learners are expected to study both Chinese and English language arts in an effort to develop their literacy in both languages. The instruction time for each language must be protected with diligence.

Since no research has yet determined the best ratio of English to the partner language in instruction, there is a great deal of variation in designing instruction models particularly with one-way immersion (Howard et al., 2018). This case study showed that these two one-way Chinese immersion programs took different instructional approaches. Each selected its own ratio of two-language instruction with a different language

distribution in core subjects. Even though both schools adopted a 50/50 immersion model, their instruction model was strikingly different.

Figure 4.16 illustrates the two instruction languages distributed in School A. Special classes were generally 45 minutes per day and rotated among five subjects, arts, library media, music, Social Emotional Learning (SEL), and Physical Education (PE).

Figure 4.15

School A: Current instruction model of two language allocation
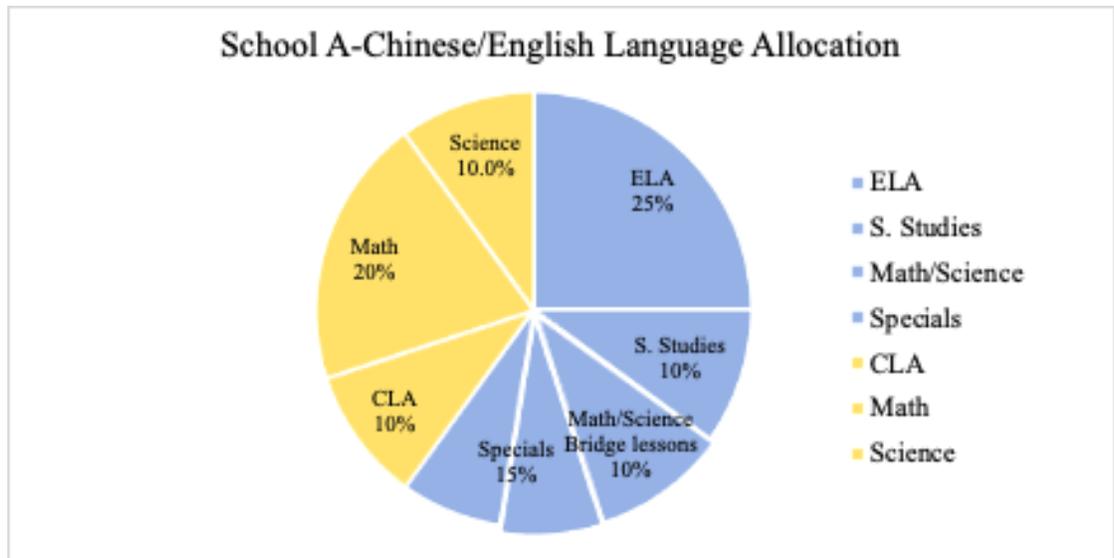
In general, there are about 300 minutes of instruction time per school day. In School A's model, a school day is divided in half by the two languages. Half of the day is for Chinese and the other half is for English. The two languages switch in the middle of the school day. By design, students should receive instruction in Chinese for 50% of the school day. Since special classes are taught exclusively in English (45 minutes or 15% a day and 5 days a week), this takes away from the 50% of the day scheduled for Chinese. Then, students would receive less than the 50% of their school day in Chinese (shown in

yellow in Figure 4.16). Thus, CLA was taught for approximately 10% (30 +- minutes) and ELA for approximately 25% (75 +-minutes) per day.

Given that Chinese is one of the most complex languages for native English speakers, it requires adequate language exposure and instruction time in Chinese for students to be proficient. There was not enough time allocated for Chinese instruction in the current School A model, and there were no cross-linguistic connections between the two languages. So, it did not provide the optimal condition to meet the learning needs of the students to be bilingual and biliterate.

Figure 4.16 illustrate how the two languages are distributed on two different school days in School B.

Figure 4.16

School B: Two language allocations for each school day
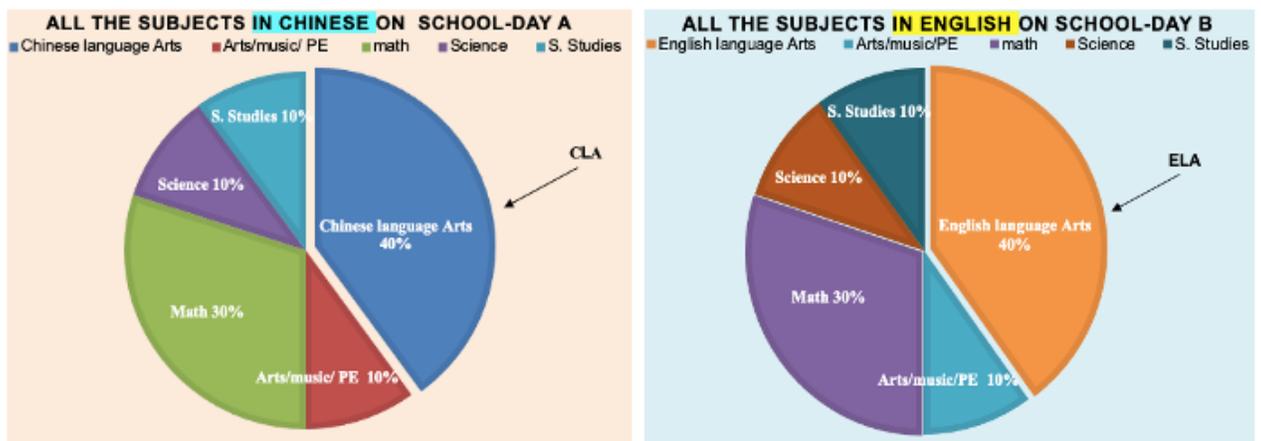
With School B's model, the academic subjects of math, science, and social studies are taught in both Chinese and English. It provided students with cross language transfer when academic content is taught in both languages. Furthermore, the two languages

alternate daily rather than switching in the middle of the school day as in School A. Thus, in this model, CLA and ELA receive 40% of instruction time to enhance biliteracy development. Please note the 40% of CLA and ELA is allocated every other day, which is equal to 20% of CLA daily and 20% of ELA daily.

The cross-language transfer is an important premise of language education, in which content learned in one language is also available in the other languages of the learner (Cummins, 2005; Genesee et al., 2006). When one language is more developed, the more significant potential is for transfer into another language. Therefore, when students are instructed in two languages, and both languages are supported and promoted in the classroom, students are more likely to develop higher language proficiency in both languages (Melby-Lervag & Lervag, 2011).

More recently, it has been shown that immersion learners activate both languages concurrently as they learn them simultaneously, even if the two languages do not share the same linguistic system (Kroll & Bialystok, 2013). Due to the spontaneous nature of activation, immersion learners need to use cognitive resources to manage the activation and switch between two irrelevant languages, training them to be a "mental juggler" of the two languages (Freeman et al., 2016).

By teaching academic subjects in both Chinese and English, the instruction model cultivates a more nurturing environment to foster reciprocal learning between the two languages. The design facilitates cross-language transfer and promotes higher biliteracy. Additionally, this instruction design also facilitates and strengthens collaboration between the two language teachers. The lesson planning and learning activities need to be coordinated since they teach the same curriculum content. However, there is no repetition

of content between the two languages, they build on each other's progress in parallel. Through the partnership, ideas are exchanged and best practices are shared subconsciously through a reciprocal relationship. Consequently, the quality of literacy instruction improves over time to benefit the learners on their path to biliteracy.

Recommendations

Based on the above analysis and discussion of the biliteracy data, the proposed instruction design reflects the changes in the following areas (see Appendix G);

- Early oral language development to enhance literacy proficiency;
- Committed instruction time to improve Chinese literacy proficiency;
- Academic subjects in both languages to enhance cross-language transfer.

80/20 Proposal for Early Grades

Existing research findings demonstrate the overwhelming influence of early literacy in immersion programs. Early literacy investment is critical and invested time in oral language development yields high-level literacy skills (NLI, 2009). It was identified in early literacy studies that oral language development is essential for later reading comprehension, as well as phonological awareness in the early years (Spencer et al., 2013). Literacy development starts early in school and is highly correlated with school achievement (Reeder et al., 2017). Participation in early bilingual education positively shapes students' academic achievement (Roscigno et al., 2001).

Research on second language learning suggests language development is not linear, but rather rapid in the early stages and slower as proficiency increases (Howard et al., 2018).

In terms of proficiency in the non-English target language, several longitudinal studies have shown that students demonstrate higher levels of proficiency in the target language in the 90/10 model in the early grades as compared to the 50/50 model (Lindholm-Leary, 2001; Lindholm-Leary & Borsato, 2006; Lindholm-Leary & Howard, 2008).

Given the empirically supported theories behind bilingual education, the recommended instruction model for Kindergarten and first grade is an 80/20 split. Chinese immersion learners would receive 80% of instruction in Chinese for academic subjects and 20% in English for ELA. In second grade, students would receive 65% of instruction time in Chinese and 35% in English. From grade two onward, Chinese instruction gradually decreases to 50%, and English instruction increases until third grade, when Chinese instruction and English instruction are equally divided.

The recommended early-grade model aims to ensure that students are prepared with the necessary Chinese literacy skills to be successful in their secondary learning in Chinese. However, given the demands for English literacy coverage in the early grades due to state testing requirements, this requirement might not be practically achievable in the current accountability context.

Increased Instruction Time for CLA

Drawing from the analysis of Chinese literacy assessment data from the two schools, instruction time is strongly correlated with students' learning outcomes in Chinese literacy, especially in reading and writing.

Additionally, the complexity and different linguistic system of Chinese requires a longer time commitment to develop Chinese literacy skills. Thus, 40% of instruction time

for Chinese literacy is proposed over two days (see Appendix G), which is increased

from the current 10% to 20% of daily instruction time. As part of the new instruction

design, the two languages would switch on alternating days, rather than in the middle of

the school day. Thus, the real-time instruction time of 40% is spread out over two days,

not daily. To support biliteracy development, Chinese and English would each receive

40% of instruction time over two days.

Academic Subjects in Both languages

This study's findings are consistent with the previous research on the positive

effects of cross language learning between two program languages in immersion

programs. The proposed instruction design integrates Chinese and English into the

learning of all core subjects to reflect the cross-language aspect.

In the new instructional model (Appendix G), CLA and ELA receive exclusive,

protected, equal instruction time in all academic content, and students have ample

opportunities to transfer language skills between the two. The new model promotes cross-

language connections and reciprocity by fostering a mutually respected language learning

environment. With the content-based immersion approach, the model supports optimal

language acquisition in meaning-focused contexts.

<center>**Limitations**</center>

The findings shed some light on issues in biliteracy development; however,

several limitations should not be overlooked. First, the smaller sample size could make it

challenging to generalize the findings. Second, the two schools used different tests in

ELA and CLA, although the developers of the assessments claimed the tests were CCSS-

aligned. Third, both schools are part of the public school system; although, School B is a

charter school with greater flexibility over curriculum, academics, and other matters that are usually decided by the district.

Conclusion

In the study, School B students demonstrated more positive Chinese literacy trajectories than School A students. However, the Chinese literacy goal was only partially reached based on the target measurement of 80% that was established for DE Chinese immersion programs. English continues to be privileged in both academic and social contexts of language immersion schools. Regardless of the immersion program models (Babino & Stewart 2017), the goals of bilingualism and biliteracy continue to be challenging to achieve.

In addition, district or school stakeholders should be aware that biliteracy development is affected by many variables beyond instruction design, literacy instruction strategies, and best classroom practices discussed in this paper. At the very least, some inherent school contexts should not be overlooked or ignored. For example, a Chinese immersion student who is a native English speaker may have limited opportunities to practice or use Chinese outside the classroom. Other immersion programs also faced similar challenges. Study results by Lyster (2007) indicate that immersion learners frequently struggle to achieve native-like proficiency in their partner language. Language learning is hindered by the lack of opportunities to practice with native speakers of the partner language. Students attending a strand program that operates alongside an English-dominant school will have more challenges using the partner language. Students are more likely to prefer English when interacting informally or socially with their peers and teachers (Lyster, 2007).

Thus, school leaders are encouraged to leverage 21st-century technology by connecting immersion students with native Chinese speakers via Zoom or Skype. The virtual connection is intended to facilitate communication between Chinese immersion learners and native Chinese learners of English. Both sides of the equation benefit from this approach. Native-English learners in Chinese immersion programs practice their target language with native-Chinese speakers, while native-Chinese speakers practice their English with native-English speakers in Chinese immersion programs.

Moreover, having meaningful interactions on real-life topics will help participants better understand each other's cultures and motivate them to practice more to improve their linguistic abilities. Ultimately, language proficiency is measured by how effectively learners communicate in Chinese by performing various language functions in real-life situations. Ideally, these virtual zoom lessons could be pedagogically integrated into the Chinese literacy curriculum. Language content embedded in the Chinese literacy curriculum sets the objectives of each virtual class or lesson.

Bilingualism is associated with enhanced cognitive, linguistic, and academic development when both languages are allowed to develop and flourish (Cummings, 2000). These findings should be considered by school leaders when implementing language immersion programs. Considering these realities, school stakeholders should be more committed to partner language literacy development to achieve the program goal of biliteracy.

Chapter 5

Reflection on Improvement Efforts

My analysis to address deficiencies in Chinese literacy development in one-way Chinese immersion programs yielded valuable information; however, it was not without challenges. In this section, I will reflect on the overall process of the ELP. Then I will share the lessons learned in data collection and analysis. Finally, I will discuss future steps I would take based on the findings of this research project.

Deciding the Research Direction

The overarching goal of my ELP is to improve the Chinese literacy development of Chinese immersion students in Delaware. The problem of low Chinese proficiency rates was observed and reported through assessment records, and community stakeholders were made aware. As an instructional coach for the program, I was eager to find a solution to fix the low Chinese literacy proficiency rates when I began the project. My initial discussions with several Ed. D. course instructors centered around why and how the problem occurred. My response to these questions led me in a different direction.

My initial steps in deciding the direction of my research reminded me of Albert Einstein's famous quote: "If I had an hour to solve a problem, I'd spend 55 minutes thinking about the problem and 5 minutes thinking about solutions." This perspective reassured me. Before attempting any solutions, I needed time to deepen my understanding of the issue and prioritize possible causes. I developed an understanding of the value of diagnosing the underlying cause of an issue by relating it to how a doctor treats their patients. Doctors rarely prescribe treatment plans without first analyzing the

underlying cause. When we treat a symptom without addressing the underlying cause, the root problem manifests itself in new ways or repeated itself. This research-oriented mindset defined my course of action in this ELP.

The Underlying Causes

As the first action step, I constructed a fishbone diagram to illustrate the possible contributing factors to Chinese deficiencies. Then I examined it from multiple lenses and perspectives, including leadership roles, students' intrinsic motivations, instruction design, teacher dedication, community support, and parental involvement. Through the first few years of course studies, I discussed the diagnostic process with instructors, including my advisors, immersion experts, colleagues, and committee members. These conversations shaped my focus on what data is available to validate the possible causes. For instance, we asked, what tangible evidence exists to convince stakeholders to gauge changes when considering leadership roles in supporting Chinese literacy development? Maybe not a sufficient amount.

The preliminary analysis of the possible contributing factors was narrowed down to the language of instruction, including the ratio of the two program languages used in teaching academic subjects. Ultimately, teachers' survey data and biliteracy achievement data analysis validated the hypothesis that the instruction design played a vital role in Chinese literacy development, which led to research-based recommendations.

Informing the Problem

Logic Model of Chinese Immersion Program

It is important to note that Chinese immersion is a relatively new approach to developing biliterate graduates who meet the needs of the multilingual workforce of the 21st-century global market.

The artifact of the logic model (Appendix A) for the DE Chinese immersion programs visually displayed the relationships between the various strategies and their intended effects of on achieving the program's goals. It provided the audience and readers with a graphic overview of how the program works based on the recruiting strategy of the students, the implementation process of curriculum development, teacher training, and school leadership support, including parents' involvement. The logic model helps the reader better understand the Chinese immersion program's structure and how the program is designed to achieve intended short-term and long-term objectives and goals.

Literature Review on language immersion education

The literature review (see Appendix B) was a challenging and lengthy process due to the fact that there is limited empirical studies and research on Chinese literacy development in one-way Chinese immersion programs. I initiated meetings with the UD library specialist to seek her expertise on efficiency in generating resources on the education database. Due to the scarcity of research on this subject, it was inevitable that very few studies were generated on the topic. The situation motivated me to explore general second language acquisition research and available studies on alphabetic language immersion. Some of the research studies were on native-Chinese speakers in China learning English in an English immersion program, even though my study focuses on native-English speakers who are learning Chinese in a Chinese immersion program.

The literature review consisted of more than fifty references. I leveraged these resources to synthesize the discussion and issues remotely related to my project. The review laid a solid research foundation to set the stage for the ELP project. In addition, I compiled a list of definitions of terms frequently used in immersion education to familiarize the readers. The literature review also serves the audience as a resource regarding immersion programs' benefits, the importance of early language oracy, and linguistic language connections, particularly the striking differences between Chinese and alphabetic languages.

One of the literature focuses was on language immersion education as a means of effectively learning new languages. The review cited research findings from various empirical studies that support language immersion as an effective way to learn a new or additional language other than English. It also defined the differences between language learning and language acquisition. The benefits of bilingual and multilingual skills were summarized, and gaps in the literature were identified. Specifically, there was a gap in the literature concerning the concept of linguistic and literacy transfer between the Chinese and English languages. The unique characteristics of the Chinese language were also explored and discussed, along with its implications for native-English-speaking students, especially those in one-way Chinese immersion programs.

This literature review laid the groundwork for the ELP's study of how instruction design affects biliteracy development in one-way Chinese immersion programs. To familiarize the audience and readers with the background of language immersion education, various program models were discussed, including factors contributing to the development of biliteracy. Furthermore, the review provided strong empirical evidence

supporting the proposition that the ratio of the two languages used in teaching academic

content can contribute to biliteracy development as a program goal.

Validating the Hypotheses

Lesson Learned in the Survey Process

Having worked as an educator for decades, it has become my second nature to

have an end goal in mind and to adhere to timelines. The objectives and timeline of every

task took priority before any action, whether in selecting courses, completing

assignments, or planning research. However, my best efforts were unable to meet my

expectations regarding managing objectives with time constraints.

My anticipation of the unpredictable timeframe of the IRB approval process

prompted me to prepare paperwork early. I understood that any data collection would be

prohibited without IRB approval. Conversely, it's a dilemma and a catch-22 situation

because any modification upon IRB approval requires another round of approval, which

requires additional 'wait' time.

I would recommend a well-thought-out application on the first try to avoid any

potential modifications. With this in mind, I made endless and necessary revisions to the

IRB application, including the survey protocols and questionaries, before submission.

With the permission and approval of the advisor and committee, the application was

submitted to the IRB board at the beginning of the spring semester. According to my ELP

II contract, the objectives of the spring semester were to complete the data collections,

report the survey results, and write a summary of achievement data analysis, along with

the other three remaining artifacts. It was a tight deadline, even without any unexpected

delays.

However, in praxis, many factors beyond our control could disrupt a well-designed plan. I learned a regrettable lesson when one such factor was participation. Because no compensation or incentives were mentioned for the teacher survey participants in my original application, the feedback from one of the two schools was lower than the other. To increase the likelihood of balanced responses from both schools, I reached out to the designated contact person in School B. Based on her experience, she suggested offering incentives for participants. I thought it was an excellent idea and agreed to provide a gift card to each participant, hoping more would be willing to participate. As I focused on boosting the participation rate, I overlooked the additional wait time associated with the IRB modification process. Upon submitting the modification request, I estimated a relatively short wait; however, the modification process turned out to be a month long. Subsequently, I lost another four weeks for data collection in addition to the wait time for the original application.

Thus, my spring 2022 semester was my least productive, and my ELP was paused for its entirety. In order to make up for the time lost, I spent the following summer catching up on the work I had missed.

Biliteracy Achievement Data and Survey Analysis

In terms of my ELP, I consider data analysis to be the most critical component. Without data, the underlying causes of the Chinese deficiencies were only assumptions. In addition, without supporting data, I would not have been able to continue my ELP. My original work plan was to collect and analyze data during the spring semester. The lost time in the spring fueled my anxiety over the unknown data results. As I pondered the

unknown, the patient metaphor I used earlier came to mind. When waiting for test results, patients' anxiety is bound to increase.

While the data analysis was the most time-consuming and labor-intensive process, it was also the most fulfilling and rewarding one when a hypothesis was confirmed. I gained additional knowledge about statistics outside of what I learned in the data collection and analysis course. In the meantime, the majority of my ELP data analysis was dominated by revisiting the concept and data process, which I had learned previously, and exploring new tools. First, I needed to sort out all the raw data from the teacher survey and biliteracy data in the three school years, which was tedious, particularly with the survey results.

In gathering survey data on the similarities and differences between the two programs (see Appendix E), visuals offered significant advantages for readers to grasp. Even though I assumed Qualtrics could merge the two groups' data, I was unaware of the process to do so even after multiple contacts with Qualtrics' technical support. Without other options, I turned to 'how-to' videos on YouTube and was amazed by the outcomes.

In my opinion, establishing the objectives of each analysis task and deciding what statistical tools were needed to achieve the goals were vital steps. For instance, there was a vivid illustration in the bar chart on how the Chinese immersion students in School A performed on the state accountability ELA assessment as compared to their non-immersion peers. In my first draft, I did not include the T-test since I thought the chart with different colored bars would suffice for the public audience to see that immersion students scored higher than their non-immersion peers. However, I later wondered, what if the results happened to be coincidental or random? It was be possible that the public

audience or school stakeholders would have the same question about the two groups' different test scores without statistical support.

As a researcher for this study, I was responsible for providing as much evidence as possible to stakeholders in the learning community schools as well as the general public. In this case, a statistical test was deemed a necessary and responsible step for me in order to present evidence that supports the assumption. I spent a few days exploring all the tools to decide what to use in this analytical task of determining whether significant differences existed between the two groups' test scores, including T-test, Z-test, Chi-square, Pearson r, and ANOVA. After reading statistical explanations of each tool, I chose the T-test as it was intended to provide inferential evidence. Once the T-test was selected, it took another few hours to decide whether to do a one-tailed or two-tailed analysis, paired or unpaired. The calculation was a more straightforward step compared with others due to the technology. Upon entering the data for the T-test, Excel did the rest of the calculations. I was amazed by the technology-enhanced tools embedded in Excel.

Interpreting the results led me to spend additional time studying the different terms and values in the table: df, f-value, t-value, and p-value. Subsequently, I became fascinated with statistics, particularly with the vital role of the p-value in data analysis and conclusion. As Beers (2022), a content expert on fundamental analysis, recently defined, a p-value is a statistical measurement used to validate a hypothesis against observed data (Beers, 2022). The p-value determines how the conclusion is drawn at the end, proving or disproving the assumptions.

The time I invested in the detailed steps in preparation helped me tremendously in other parts of the data analysis of the ELP. In reporting teacher survey results of the two schools, I used the ANOVA test to validate the assumption of the two groups' responses and explain that there was no significant difference in literacy instructional strategies. Moreover, it was an invaluable component in connecting the statistical data analysis with the study findings. One of the crucial questions was whether the instruction design could influence the learning outcomes. The differences in the instruction design of the two programs were identified, including the protected time in Chinese literacy development and language of allocation. In order to prove that the time designated in CLA would lead to a higher literacy proficiency, the Pearson r test was performed prior to ANOVA. The objective of the Pearson test was to prove a strong correlation between instruction time and learning outcomes. The next step was to verify that the correlation was statistically significant, showing that the more time invested in Chinese literacy led to higher test scores.

The findings illuminate the importance of the instruction design of the two-language allocation in biliteracy development. In general, the non-English partner language is widely perceived as less privileged than English, as English is the predominant language not only in the school community but also in society. This study's findings informed my recommendation for the new instruction design synthesizing immersion research and second-language acquisition theories. I was delighted with the results of the analysis. Despite the long hours spent working on the project, it was a gratifying experience.

The Next Steps

Presentation of findings (Appendix H) and research-based recommendations (Appendix G) comprised the improvement plan that would be part of the action in the next phase. After completing the ELP, I will contact School A and schedule a meeting with district stakeholders to share the findings. I hope the new instruction idea can be implemented as soon as possible. In the event that the improved design is implemented, monitoring the impact of the new instruction design on students' biliteracy development would be another research project.

Chapter 6

Reflections on Leadership Development

My passion for language immersion education motivated me to take this journey of pursuing a doctorate in education leadership. As a retired bilingual educator, people are surprised to learn that I started the program in my senior years. It is a common belief or perception that pursuing a doctorate is an avenue of enhancing one's career, particularly in education leadership programs. I might be one of the exceptions in this case. I made it clear in my application essay that it was for personal enrichment as a lifelong learner.

Nevertheless, the knowledge and skills I've gained throughout the course studies at the University of Delaware (UD) have been far beyond personal enrichment. Having been a school administrator, I wish I could have had this opportunity earlier in my career. The learning experience would have elevated me to become a much more effective educator, mentor, instructional coach, and leader of a districtwide World Language program. I therefore strongly urge anyone who is still hesitant about continuing their education to take action and join UD's Ed. D. program. The time and effort invested will reward you with career advancement and human capital gains.

In this section, I'd like to reflect on my experience as an education leader with a different cultural background, being a theory-driven practitioner, and research-informed decision-making in personal and professional life.

Different Cultural Background

As I grew up in a country with a dominant one-party system, my political literacy of the United States (U.S.) is limited. This made it difficult for me to comprehend the

politically charged public education system in the U.S. In my reflection, it did not appear

that politics ever influenced education policy-making in China, as there are no other

political parties to challenge or oppose it. For instance, in 2003, English became a

compulsory subject from 3rd grade up in China. There were no instances of local

resistance to implementing the new policy in the country's roughly 180,000 primary

schools, and it was adopted nationwide within a short time. Some schools were so

enthusiastic about the benefits of the new policy that they introduced it in preschool and

Kindergarten as well. Due to my lack of strong understanding of the U.S political system,

I constantly wondered why it took so long for most education reforms, such as No Child

Left Behind, Race to the Top, and Common Core, to go into effect.

Additionally, before I began the Ed. D. program, my cultural background often

led me to view matters with a collectivist perspective and take a more accommodating

approach to conflict resolution or problem-solving. Now, looking back on what I learned

from the Ed. D. courses, I have realized that my leadership style might not have been

appreciated in an individualistic culture. As a result of the course's discussions on shifting

alliances and power plays among stakeholders, I developed a better understanding of

leadership roles in organizations. My studies have enabled me to become a wiser, more

reflective member of the public-school community.

New Lenses on Public School system

The courses I took at UD, from technology to data analysis to organizational

planning in education, far exceeded my expectations, especially regarding government

agencies and public schools. During the course study on institutionalized organizations, I

was deeply struck by the term 'monopoly' used to describe public schools and government

agencies in the article by Meyer and Rowan (1977). Even though the article was written in the 1970s, the concept remains relevant today.

Meyer and Rowan (1977) argued that the structural frame with formal rules enabled public schools to be institutionalized, which in turn added value to their legitimacy in the public eyes without demonstrating efficiency or productivity. The established legitimacy helped the organization gain the trust of the public and internal participants to increase their resources and survival capabilities. The school and government agencies continued to receive funding year after year regardless of the quality of education services provided. The monopoly theory may partially explain why there hasn't been any significant improvement in student learning for the past 30 years, despite numerous reforms in public education. The inefficiencies of public education due to the "granted monopolies" have ultimately qualified the public schools without accountability.

Due to the compulsory nature of the public schools, there were no competitors for the supply of students nor the quality of the education in order to secure funding. This could also be one of the reasons charter schools are not popular within the public-school systems: these charter schools could potentially challenge or threaten public school funding sources. In order to sustain a school's legitimacy, superficial ceremonial rules and structure play an imperative role in gaining the trust and support of community stakeholders. These superficial elements include highly qualified teacher requirements, the Common Core curriculum, standardized assessments, and more.

As educators, we are all aware that these rules and rationale would not guarantee improved learning outcomes for the students. The legitimacy of the highly standardized public schools and state education agencies buffer them from failure even as the

evaluation and inspection of the quality of education has been neglected and compromised under the organization's formal structure. Perhaps this new perspective might provide some rationales for why immersion programs have not been assessed or evaluated since 2012 when they were first implemented.

New Perspective on the Governor's World Language Initiative

Public education decisions have been perceived as heavily politicized. As Alexander (2013) noted, no government decision or policy on education was formed in a vacuum or blindly. In their assumptions, they base their beliefs on their understanding of reality. Stone (2012) further asserted that no policy could be neutral, and it is essential that policy decision makers consider their values. Thus, I realized that because of the structure of the political system in the U.S, questions like 'what is the purpose of education and what should students be taught?' have been debated over the years. There was stress in a political system caused by value conflicts among competing political agents (Wirt & Kirst, 1992).

As my research project was focused on Chinese immersion programs, which were initiated under the former Governor's World Language Expansion Initiative in 2011, I began re-evaluating the initiative by asking the same question about the purpose and what should be taught in public schools. Before enrolling in the program, my appreciation and promotion of the initiative were only based on my personal views as a bilingual educator. My perspective on this initiative was expanded with the new lenses rendered from the four curriculum ideologies I learned.

Without ambiguity, the Governor initiative addressed the value of public education from the social efficiency point of view to "prepare generations of Delaware

students with the language skills to compete in an ever-changing global economy at home and around the world" (Governor WL Initiative, 2011). Under this initiative, current Delaware students will graduate with advanced-level world language skills to meet the needs of the 21st-century global job market. World language capacity is crucial for the state of Delaware to maintain and strengthen its economy. The educational purpose of the initiative reflects the same value as that of Social Efficiency, which, as identified by Schiro (2013), seeks to prepare youth to be contributing members of society in the future.

Historically, decisions on language education have always been politically charged. As an immigrant, my view on bilingual education was initially deeply influenced by policy promoting 'assimilation.' 'English only' legislation in California in the late 90's ended the state's 30-year-old bilingual programs. Due to the fact that the Senate supported the Governor's initiative along with funding from the state, I assumed there would be no issues in implementation. However, while human values and belief systems are invisible, what people believe will inevitably be reflected in their actions. I have interacted with some principals and parents who devalued the importance of global competence, including multilanguage skills, because they believe core subjects, such as math and ELA, are sufficient for students to compete in the 21st-century global market.

The social efficiency ideology reflected in the Governor's initiative could have helped me gauge the support from the local school district or school board for Chinese immersion programs. As the only Chinese-speaking staff member for the DDOE's Chinese immersion program, a coalition of additional support was urgently needed. However, as an empathetic bilingual leader, I am willing to place myself in the shoes of school leaders with different values than me on multi-language skills. After all, education

leaders are directly responsible for students' learning. If all stakeholders work together to place 'students first,' any conflicts will be resolved to reach a consensus on what is best for students. As Fowler (2011) suggested, we all care about fundamental education values but prioritize them differently.

The new perspectives and knowledge I gained from the Ed. D. courses have energized me to promote language immersion further in order to benefit future generations of Delawareans. Additionally, I am motivated to continue my empirical studies in the Chinese immersion programs as there is little research on Chinese and English cross-linguistic transfers.

Evidence-based Decision-making as a Lifelong Learner

The thought of doubting research data's ability to improve decision-making never crossed my mind before I joined the program. I firmly believe that data-based decision making and research-based practices are more effective. I naively assumed that the educational research evidence and findings were regarded objectively.

However, from the course studies, the research evidence was used somewhat subjectively based on Kennedy's (1984) analysis of real-life examples. I realized that decision making predominantly depends on the decision-makers interpretation and perception of particular research findings along with their shared working knowledge and personal interest. The decision making is not based on the research findings or evidence alone. Instead, it involves various factors in applying the evidence to reach a final consensus among participants, such as individual beliefs, interests, and work. With the bureaucratic management of the school hierarchy system, the personal interest or

interpretation of the person in charge, the person with legal authority, or the school board might ultimately control the final decision, regardless of the research.

The decision-making during the pandemic outbreak on school re-opening is an excellent example of how the same data on COVID-19 was utilized differently by the individual school districts and state governors. Some schools' decisions to remain in full-time virtual classes was recommended by the school board, making students' safety their priority, even though the district survey results indicate the preference for 'in-person' instruction.

Before joining the Ed. D. program, I considered myself more of a practitioner, and most of my decisions were supported by my classroom experience. Learning data-driven decision-making skills through these courses equipped me with the tools and skills I need to make research-based decisions as a leader and a lifelong learner. Data-driven decision making can improve students' learning, but it is much more challenging in practice than on paper. Data collection and analysis in my ELP project not only taught me the importance of data but also how to validate assumptions with the necessary statistical evidence.

Effectively using data in decision-making requires tools, knowledge, and, more importantly, a shared vision among stakeholders, instructional staff, and parents in the school community. The decisions made with a shared vision among stakeholders ultimately lead to improving the quality of education in DE to benefit future generations.

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Exhibit A: Organization Chart

Secretary of Education
Susan Bunting
302-735-4000

Early Childhood Support
Yvette Sanchez Fuentes
Associate Secretary
302-735-4295

Office of Early Learning
302-735-4295

Office of Child Care Licensing
302-892-5800

Office of Equity and Innovation
James Simmons
Director
302-735-4085

Chief of Staff/Policy Analyst
Emily Cunningham
302-735-4003

Communications
302-735-4006

Human Resources
302-735-4030

Deputy Secretary/ Performance Support
Christine Alois
302-735-4000

Academic Support
Monica Gant
Associate Secretary
302-735-4200

Curriculum, Instruction and Professional Development
302-735-4180

Student Assessment
302-857-3391

Exceptional Children Resources
302-735-4210

CTE/STEM
302-735-4015

Higher Education
302-735-4120

Student Support
Mike Rodriguez
Associate Secretary
302-857-3301

School Support Services (School Climate/Bullying, School Counselors, Nutrition and Nursing)
302-857-3372

Adult & Prison Education
302-857-3340

Driver Education (Public/Non-Public)
302-857-3320

Title/Grants Support
302-857-3372

DIAA Athletics
302-857-3365

Educator Support
Jon Neubauer
Associate Secretary
302-735-4023

Educator Effectiveness
302-735-4023

Licensure/Certification
302-857-3388

Investigations
302-735-4023

Performance Management
302-735-4090

Data Management and Governance
302-735-4090

Operations Support
Kimberly Klein
302-735-4000

Finance
302-735-4040

Technology
302-735-4140

Charter Schools
302-735-4020

School Transportation
302-857-3390

Capital Projects
302-857-3364

Revised
12/16/2020

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APPENDICE
Appendix A

ARTIFACT 1: PROGRAM LOGIC MODEL

Chinese Immersion Program Logic Model

Li Li Lin December 19, 2021

Strategies	Early objectives	Intermediate objectives	Long-term goals

Promotion/recruitment
-Promoting program goals
- equal access to all students

Increased district access to information on program design & goals

Increased number of program applications

Increased enrollment of students

Increassed student participation in program

Curriculum Adaption
-Principles of immersion
-Effective instructional model
-Chinese literacy curriculum

Increased teacher access to Chinese curriculum

Increased teacher use of Chinese curriculum

Improved Chinese curriculum adaption

Teacher Professional Development
-Mentor for novice teachers
-Strategic PD plan to meet needs of diverse teachers

Increased mentor availability for novice teachers

Increased new teacher contact hours with mentor

Increased access for sponsored Chinese teacher PD

Increased teacher participation in PD

Improved Chinese literacy & content instruction

Improved student academic & language learning

Increased student's academic achievement & biliteracy skills

Assessment
Data-collecting & monitoring on students' academic / language progress for continued improvement

Increased availability of assessment data for teachers

Increased teacher use of assessment data

Improved tailored instruction to enhance students' learning

Increased student's employability

Leadership Development
-Enhance the capacity of adaptive & cultural competent leadership

Increased administrator's awareness of program goals & academic benefit

Increased knowledge of program goals & benefits

Increased support of program and staff

Increased student class engagment

Parent Involvement
-Building parents' capacity in advocacy of early language learning
-Resources for parents

Increased parent access to information on immersion /early language learning

Increased parent understanding of immersion/early language learning

Improved teacher-parent partnership

Improved parent support at home

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Appendix B

ARTIFACT 2: LITERATURE REVIEW ON LANGUAGE IMMERSION

Introduction

This literature review was intended to provide background regarding language immersion education, exploring various program models and their contribution to achieving immersion learner biliteracy. The review set the stage for a case study on biliteracy development in the two Chinese immersion schools explored in the Education Leadership Portfolio (ELP). This review also attempted to answer the following questions:

a) whether new language acquisition could occur beyond one's native language;

b) how student age influences language acquisition and individual capacity to learn new languages, and

c) the appropriate ratio of use for each of the two languages, English and a target language, in the effective immersion programs for biliteracy development.

This review made use of context-specific terminology as presented in Appendix A. The defined terms included;

- different types of immersion programs, such as one-way, two-way, full, and partial models;

- language use, such as target, partner, first language (L1), and second language (L2); and

- constructs such as biliteracy, bilingualism, bilingual education, and additive bilingual education.

This literature review intended to introduce and define language learning in general, followed by identifying effective ways to learn new languages through language immersion education. The benefits of bilingual and multilingual skills were summarized. Gaps in the literature were identified, specifically, the literature gap regarding the concept of literacy transfer between the Chinese and English languages. Last, an effort was made to identify unique characteristics of the Chinese language and the resulting challenges facing students whose first language is English, particularly the challenges experienced by students in Chinese one-way immersion programs.

Language Acquisition and Language Learning

According to MacWhinney (2018), most children flourish when learning their native language. As practically every human learns their native language, people may have taken the process of learning a new language for granted. Learning languages may be viewed as part of human nature, an instinctual behavior such as blinking or breathing. However, the process of learning a language is far from simple, and it may be one of the most daunting talents anyone could ever attempt to acquire. Human language is among the most complex human behaviors (MacWhinney).

Early linguistic theory (Chomsky, 1975) described the initial childhood process of learning a language as language *acquisition*. Chomsky believed language *learning* was a universal skill all humans possessed at birth. According to Chomsky, language development had more in common with physical growth than structured learning

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processes: To consider language as equivalent to a physiological function is quite natural and plausible.

Language acquisition differed from language learning in that acquisition required little formal exposure to languages and acquired language skills subconsciously. On the other hand, the process of learning a language requires a conscious understanding of its formal structure, such as grammatical rules, the use of prepositions, adverbs, and other specific language components. Complete competency in the target language was inevitable, whether a native language or an additional language, assuming a child has been given requisite information during the crucial growth period (Lenneberg, 1967; Krashen 1975a). According to Cazden (1965) and Fathman (1975), explicit instruction was unnecessary during the crucial growth period. Learning followed a predictable path based upon sufficient input of the language, guided by universal methods for all language learners (Slobin 1973; Bailey et al., 1975).

Lenneberg (1967) suggested that language learning was also a social phenomenon. A child commences at birth to acquire language skills, progressing in skill acquisition until adolescence. During this period, the environment exposes the child to a specific language (or more than one language in a multilingual household) for the first three years of existence. The term *exposure* referred to children being substantially immersed in a particular linguistic setting where they could hear, engage, and speak as they acquired language skills. Socialization significantly helped with language acquisition, according to Lenneberg. Because the language was perceived as a social phenomenon, separating linguistic development and maturity from social and cultural maturity would be challenging.

Research by Braine (1971) indicated that adults were capable of acquiring new languages, at least to some extent. According to Krashen (1976), the majority of adult second language teaching approaches presumed adults did not acquire languages through exposure; adults learned through intentional educational processes. In Braine's (1971) study, subjects listened to and repeated statements in the made-up, meaningless language. Many subjects, who were able to complete this exercise, could not state the grammatical principles involved. Instead, they said they used phonetics to determine whether or not a phrase sounded right. Language acquisition (informal exposure), rather than language learning (formal study), was likely to have occurred in Braine's study, possibly aided by the fact that the linguistic environment required attending to phonetic sounds rather than the grammatical rules and feedback typically characterize formal language learning.

Research by Krashen and Seliger (1976) suggested that accomplishing both language acquisition and language learning in the classroom was plausible. For example, classwork in English language arts classes specifically focused on improving conscious linguistic knowledge of a student's native language. On the other hand, acquisition occurred to the extent that the native language was communicated and practiced daily. The research by Krashen and Selinger indicated that formal language learning and informal language acquisition environments played a role in all aspects of second language competency. It was no surprise that Krashen and Selinger reported studies suggesting language immersion could result in more remarkable linguistic skills because it provided both informal language exposure and formal language learning instruction.

Similarly, according to Krashen and Seliger (1976), language teaching systems that involved active student participation demonstrated great success in transferring new

language skills (e.g., Gattegno's Silent Way[16]; Asher's Total Physical Response Method[17]; Newmark's Minimal Language Teaching System[18]; and Winitz and Reed's Method[19]. The success of these teaching systems suggested that both language acquisition and language learning could happen simultaneously. Language immersion education aims to combine the teaching systems identified herein as best practices to achieve second language competency and develop biliteracy (two languages) or multilingual literacy (more than two language competencies).

The studies referenced by Krashen and Seliger in 1976 concluded that, for a child, second language acquisition was plausible. Specifically, exposure to informal language environments was necessary for the learning process. For older children, second language proficiency requires both language acquisition within an informal environment and formal language instruction to optimize both oral and written language skills.

Age Factors

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[16] The Silent Way is a language teaching approach developed by Caleb Gattegno to emphasize learner autonomy. The teacher uses a mixture of silence and gestures to elicit responses from learners.

[17] Total Physical Response (TPR) is a language teaching method developed by James Asher, who taught vocabulary concepts using physical movement to react to verbal input. The process mimics how infants learn their first language; it reduces student inhibitions and lowers stress.

[18] The Minimal Language Teaching System is a language teaching approach by Leonard Newmark to promote language learning in a chunk, rather than rule by rule, to gain communicative competence.

[19] The method developed by Winitz, Harris & Reeds, James in 1975 was considered a comprehension and problem-solving approach to gaining language competency.

Most linguists consider age to be a critical factor in language learning. At a young age, the plasticity of a child's brain enables quick adaptation to unique sounds. For example, according to Harley (1986), Lenneberg (1967), and Lightbown and Spada (1999), the best time to learn a second language was during childhood. Worldwide, children acquire the syntactic and morphological structures of their native language by the age of three, strengthening the theory that hereditary factors play a significant role in influencing the maturation process (Fenson et al., 1994; Lenneberg, 1967; Tania, 2013).

According to Lenneberg's (1967) hypothesis of a *critical period*, primary language acquisition must occur before the completion of brain lateralization, approximately at adolescence. The hypothesis presumed that if first language acquisition occurred before adolescence, there was a higher probability of quick and successful language acquisition. The critical period theory indicated a significant decrease in older students' ability to learn a second language. After adolescence, Brown (1994) stated that the child's ability to quickly learn languages practically vanished, explaining why some adults struggled to reach native-like command of a second language regardless of how they learned new languages, whether informally or formally. Comprehensive research studies by Hakuta et al. (2003) and Willey et al. (2005) demonstrated that the capacity to master a new language gradually declined in adolescence.

Second language development after the critical period was affected by linguistic and societal factors. Kroll and Tokowicz (2005) explained that when a person learns a second language after childhood, the learning is built upon the individual's native language. Linguistic factors, for example, might include cross-linguistic transfer, which involves transferring structures such as the position of the verb in a sentence from the

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native language into the second language or vice versa. Influencing social factors in the language learning environment also affected second language acquisition (MacWhinney, 2015). For example, family members might support children more than older individuals while they learn a new language. If young children have problems expressing themselves, parents and family members might be more likely to encourage and guide them (MacWhinney).

According to the literature reviewed herein, it appeared those very young children before puberty had a solid ability to acquire languages, but they were also more vulnerable to language loss. For example, Pallier et al. (2003) evaluated a group of Korean adoptees who arrived in France at the age of eight. At the time of testing, these children were in their 20s and had stopped speaking Korean. Brain images related to language testing revealed abnormal brain mechanisms supporting the French language, indicating French had become their first language. The loss of Korean, their first language, was due to the loss of continued exposure and opportunity for use within an informal language environment. Moreover, research findings suggested that the Korean language had less power and social prestige in France (Pease-Alvarez, 1993; Portes & Hao, 1998; Veltman, 1988).

Not surprisingly, the ratio of English-language use to a non-English target language for instructional purposes was considered a critical factor for achieving biliteracy via immersion education. A study by Lindholm-Leary, K. J. (2005) noted several factors critical to achieving biliteracy, such as the level of attainment of language and literacy in upper elementary school, the length of time for growth and development of language and literacy abilities, and the nature of the relationship between language and

literacy growth in a child's native and second languages. Developing a better understanding of these issues was central to the continued success of immersion programs.

The ratio of English language used to a non-English native language, and factors including age, the language learning environment, and the length of exposure to the new language, played crucial roles to different degrees in the new language learning process. By building on these factors, the following section helps the reader understand the benefits of learning a second language and effective approaches to learning new languages.

Language Immersion Program Development

Fortune and Tedick (2019) discussed the emergence of bilingual language immersion education in the United States (U.S.) and Canada in the 1960s and 1970s. Immersion education was the first type of bilingual education[20] in the U.S. after the French-Canadian immersion programs of the 1960s (Genesee, 2004). The success of the Canadian language immersion programs at that time provided support for new language learning in general as well as the teaching approach. Studies by Swain (1998) and Swain and Lapkin (2002) later indicated that the U.S. had adopted the additive bilingualism model for second language immersion. This model promotes the continued improvement of learners' native language while learning a new language.

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[20] Education promotes bilingual (or multilingual) competency by using both (or all) languages as media of instruction for significant portions of the academic curriculum.

According to the Canadian immersion program's core curriculum design, native French-language students studied content in French for approximately 50% of the school day, with the remaining time spent studying content in English (Swain, 2000). English, as a second language, was also used to teach subject matter within the curriculum. These Findings suggested that language immersion with both English and French instruction was an effective way to improve language literacy and proficiency in preschool and primary school students without negatively impacting retention of their native (French) language (Cummins & Carson, 1997; Genesee, 1987; Lapkin, Hart, & Turnbull, 2003). Studies by Turnbull et al. (2001) indicated that once official English language arts instruction began in Grade 3, native French-speaking students who had participated in immersion studies performed at the same level as their monolingual counterparts in mathematics and English language arts. Furthermore, Lapkin et al. (2003) found that in Grade-6, the children who had participated in immersion programs performed better on English literacy and mathematics tests than their monolingual English-only counterparts.

It appeared that the immersion program structure strengthened cognitive process as well as native language literacy development. That immersion learners outperformed their monolingual peers illuminates the significant benefits of being bilingual. The immersion learners utilized two languages, which required constant *code-switching* and conflict resolution. Code-switching involves going from one language to another when it is necessary. Interactions in two languages increased the demand for cognitive processes and the physiological need to develop brain mechanisms to support simultaneous fluency (Kroll et al., 2015).

The literature illustrated the different instruction program options available to PreK-12 students for a range of purposes, both native English-speakers and those without an English language background. These programs included:

(a) *Developmental bilingual programs* in the United States, which targeted native English-speaking students and non-native English-speaking students;

(b) *Foreign/second language (L2) immersion*, which served English-speaking learners in the U.S. and French-speaking students in Canada; and

(c) *Two-way immersion programs*, which intentionally enrolled both native English speakers and non-native English language, students.

According to Wright and Baker (2017), language immersion education in the 21st century aims for additive bilingualism and biliteracy for all learners. Each program model made use of the non-native language as a medium of instruction for at least half of the elementary school day and offered literacy instruction in both program languages, English and the non-English target language. These programs were described as having bilingualism and biliteracy as intended outcomes.

The foundation of language immersion education was built upon content-based language instruction (Tedick et al., 2001). Research conducted by Curtain (1995) and Met (1991), for example, emphasized the benefits of content-based instruction for learning new languages. Students learned a new language more effectively when the curricula placed emphasis on studying content in a new language rather than studying the language itself formally. This approach increased cognitive engagement, which resulted in improved new language competency (Grabe & Stoller, 1997).

The Benefits of Being Bilingual or Multilingual

The current literature indicated numerous researchers had recorded the benefits of learning new languages. In addition to gaining a language proficiency and cultivating cultural awareness, learning another language offered proven personal benefits with regard to intelligence, memory, concentration, and lowered risk of dementia and Alzheimer's Disease (BBC News, 2014). In 2007, the National Education Research on World Language Education (NERWLE) provided the most consolidated findings of the benefits of being bilingual. The NERWLE claimed second language study:

a) benefitted academic progress in other subjects;

b) narrowed achievement gaps;

c) helped essential skills development;

d) aided higher-order, conceptual and creative thinking;

e) enriched and enhanced cognitive development;

f) improved a student's sense of achievement;

g) promoted cultural awareness and competency;

h) resulted in higher scores on standardized tests;

i) improved chances of college acceptance, achievement, and attainment;

j) enhanced career opportunities; and

k) benefited understanding and security in community and society.

Researchers found bilingual adults and children both tended to be better at language discrimination, meaning that they selected relevant information and adjusted response criteria more effectively as compared to their monolingual counterparts (Sebastian-Galles et al., 2012). As compared to their monolingual peers, bilingual

children were also able to recognize and distinguish between other languages they had never heard before.

According to Kroll et al. (2015), bilingualism benefits one's health and cognitive development. Multilingual adults have cognitive networks that protect them from Alzheimer's Disease and other forms of dementia associated with aging. A study found that bilingual groups were more likely to develop dementia several years later than monolingual peers. Bilingualism uses cognitive networks similar to those that enable selection and decision making in other aspects of life, such as work, family, and leisure. Being bilingual at a younger age improved cognitive processes in a way similar to skills gained from playing music or video games, but languages were likely to be used far more frequently.

Features of Immersion Programs

Johnson and Swain (1997) made a significant contribution to immersion education by showing the growth and development of immersion programs used in different institutional and cultural contexts since the 1960s. There had been an increase in language immersion programs, and concerns had arisen when curriculum content and second language acquisition content were developed at the same time. The research focused on issues most important to parents and educators, such as:

a) How much content is absorbed by students through the program (Gensee et al., 1985; Swain & Carroll, 1987)?

b) Can instruction continue to be successful and on par with that of non-immersion students when first language (L1) and literacy development are not the aim (e.g., Genesee, 1987; Swain & Lapkin, 1990)?

c) In an immersive environment, what type of L2 development may be predicted (Harley, 1984; Lapkin, 1984; Lyster, 1987)?

While these questions were fundamental to immersion education research at the time, and specific to language and content, they intended to focus on student language and learning issues. In contrast, little attention was paid to identifying the effects of different immersion program structures on biliteracy development, or on program instructional models. According to Johnson and Swain (1997) that immersion education differs from other types of world language programs in eight key ways., these include:

1) the medium of instruction is L2;

2) the immersion curriculum parallels the local L1 curriculum

3) explicit support for L1 curriculum

4) additive bilingualism is the goal of the program

5) most L2 exposure occurs in the classroom

6) students' L2 proficiency at the start of the program was similar (and limited)

7) the teachers are bilingual

8) local L1 culture dominates the classroom

Johnson and Swain (1997) further emphasized that each of these features should be seen as existing on a continuum, and that each must be present to some degree in order for a program to be considered an immersion program. For immersion programs to be successful, sufficient resources and the full commitment of all stakeholders (policy makers, teachers, students) must be in place to support biliteracy development.

Characteristics of Successful Immersion Programs

A number of factors contributed to the success of language immersion programs, including program design, instructional models, curriculum articulation, quality of instruction, materials, program structure, continuity in delivery, and more (Genesee, 2004; Howard et al., 2018; Lindholm-Leary, 2005). Swain and Johnson (1997) also identified ten variable characteristics that distinguish immersion programs from each other, which have been illustrated in Figure 1 for the purpose of the current study.

Figure 1

Ten Variable Features of Language Immersion Program
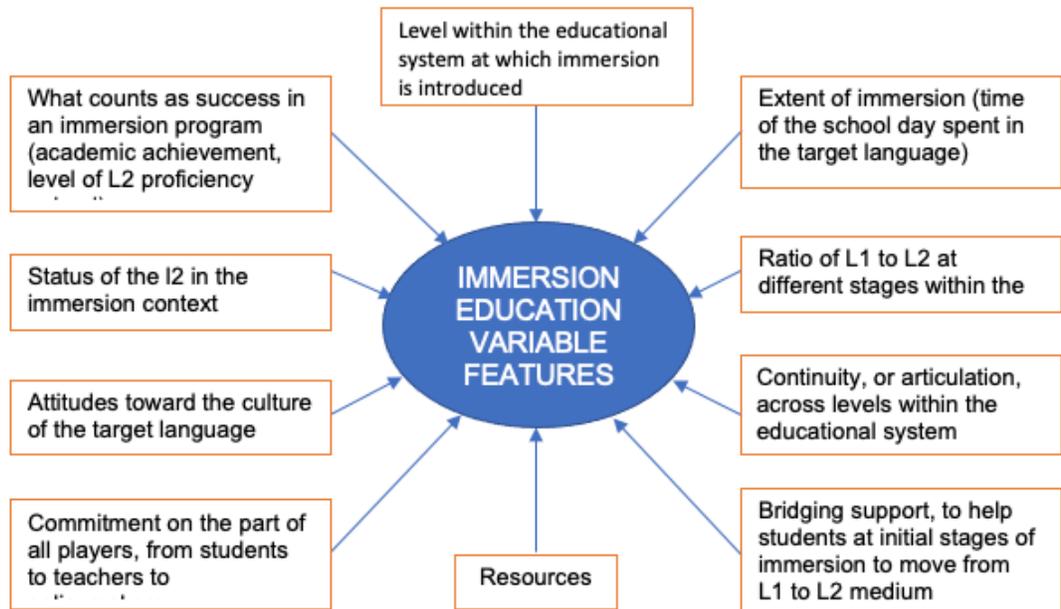
Although all of the features and characteristics identified in Figure 1 had an essential role in the success of an immersion program, this ELP was intended to investigate specific variables: a) the length of time spent teaching the non-English target language (L2) during a regular school day, and b) the ratio of time spent on L1 and L2 at

different stages within the program, including *cross-linguistic transfer* in biliteracy

development (discussed in the following section). Understanding the complex settings in

which curriculum content was taught in comparison to time spent on second language

acquisition was expected to develop concurrently during this investigation. Program

design and instructional models were discussed in terms of the success of immersion

education.

Literacy Transfer in Biliteracy Development

Escamilla et al. (2013) defined biliteracy as mastering two languages, such as

speaking, reading, and writing in two linguistic systems. The concept of biliteracy

encompasses the knowledge of sounds, symbol connections, print conventions, and the

ability to access and convey meaning via oral or print modalities (Escamilla et al., 2013).

As described by Morrow and Tracey (2012), biliteracy is the ability to read and

write in two languages simultaneously. A new language makes literacy development even

more complex, especially when it comes to learning how to read and write effectively.

According to cross-linguistic transfer research, children were more likely to

transfer structures from their native language into their second language or vice versa. In

cross-linguistic transfer, language dominance may be a limiting factor (Döpke, 1998;

Petersen, 1988; Yip & Matthews, 2000). For example, Yip and Matthews (2000) found

evidence of Cantonese-English transfer in a child learning English while primarily fluent

(dominant) in Cantonese. According to Matthews and Yip, another mitigating factor was

the development of two languages at the same time. In some cases, specific features of

the dominant or primary language may transfer to the target language when the

corresponding structure is learned later. The structure of the English language was

considered dominant in one-way Chinese immersion programs for native English speakers learning Chinese. Thus, it appeared to this study, more exposure in the Chinese-language environment and more formal Chinese-language instruction time would be required for second language literacy and necessary to develop literacy in both languages simultaneously.

Unique Characteristics of the Chinese Language

Students who are learning Chinese as a second language attempt to transfer structure in the English language to the Chinese language, which presents unique challenges compared to learning two languages that use the same alphabetic system. Native English-language speakers cannot relate the Chinese tones or the writing system to their dominant language (English). The English-language alphabet has a letter-to-phoneme structure. The Chinese system uses a character-to-syllable structure (Shu et al., 2013). As Prescott and Zhang (2017) explained, Chinese words have virtually no English cognates; hence, the quantity of Chinese vocabulary to be learned is substantial. Further, the student must learn to interpret context to know which syllable or word is meant.

In alphabetic languages, the basic units of a word are letters. In the Chinese written language, each character is formed with a particular structure comprised of a graphic element called a radical component. Written characters are structured either by a single radical component or more than one radical component. The more complex characters, composed of more than one radical component, are called compound characters (Wang et al., 2005). Radicals are written in a particular positional order and include combinations of the 24 smallest units of a character, called strokes (Sung & Wu, 2011).

In Chinese, the written character is made up of different types of strokes (Wang et al., 2005). Wang et al. (2010) analyzed and explained the natural learning process for gaining proficiency and literacy in the Chinese language in three stages. First, learners need to learn the 3000 most commonly used Chinese characters. These 3000 characters form 99% of the written texts (out of 87,019 total modern Chinese characters). Second, learners must apply their knowledge of radicals and other orthographic features to facilitate reading because the pronunciation rarely corresponds precisely to the characters (Sung & Wu, 2011). Third, recognizing and producing accurate written characters is very difficult as there are a significant number of homophones in Chinese characters that have unrelated meanings.

Since Chinese characters do not encode sound, to acquire a spoken vocabulary, students of the Chinese language should also learn Pinyin, a Romanized system. Pinyin is utilized for typing Chinese characters and for reading purposes. As indicated by Everson (2011) that the concepts involved in developing Chinese print literacy skills must all be taught explicitly from childhood if learners are to have any measure of success in reading and writing in Chinese. A logographic language like Chinese provides unique opportunities for conceptual understanding that require a different set of cognitive skills, such as the decoding process of the meaning-based script without the phonological aspects of alphabetic languages (Wang et al., 2004; Wang et al., 2005).

Chinese language literacy practices appeared to be, in part, designed to familiarize students with the characteristics of the writing system, to provide a platform for improving pronunciation, and for strengthening word recognition and meaning. Lo-Phillip (2014) emphasized that memorizing each Chinese character, written repetitions,

and oral recitations were viewed as three parts of literacy development. Literacy itself required a formal learning environment to facilitate these practices. Shu et al. (2003) also stated that repeated written practice was an essential and integral part of character learning.

Two important keys to Chinese immersion programs were taken from this phase of the literature review. First, Chinese is a challenging language for native English-language speakers or others whose mother tongues are based on alphabetic systems. The complexity of Chinese characters and written language made learning Chinese time-consuming and labor-intensive. Second, the complexity of the Chinese language system illustrates how crucial it is for native English-language speakers to invest significant time in Chinese language study. The time allocated for Chinese literacy instruction during school becomes an essential consideration when designing balanced instruction in both of the languages of a Chinese immersion program.

The Foreign Service Institute (FSI) at the U.S Department of State categorized the Chinese language as one of the difficult level IV languages (Foreign Service Institute, n.d.). The four levels of difficulty (I to IV) were based upon the language learning timelines developed from FSI's 70-years of experience teaching languages to U.S. diplomats. Level IV languages (e.g., Chinese and Korean) were described as exceptionally difficult languages for native English speakers, requiring about 88 weeks (equivalent to 2200 class hours) to reach professional working language proficiency compared with level I alphabetic-based languages (e.g., French, Italian, Portuguese or Spanish) which required about 24-30 weeks (FSI, n.d.). FSI suggested a learner would

need triple the time to learn Chinese as compared to learning an alphabetic language in order to reach a similar level of language proficiency.

The aforementioned language learning timelines provided invaluable data for guiding the process of immersion program design, specifically with the ratio of the two program languages used in the one-way Chinese immersion programs. These assertions suggested scheduling more school time in Chinese language instruction could be a crucial contributing factor toward improving the Chinese language proficiency of native-English speaking learners.

As Lo-Phillip (2014) indicated, despite the immersion program objective to produce bilingual, biliterate graduates, English was the dominant language in the U.S. and was the preferred language for general communication in this country. Consequently, a higher value was placed on teaching the English language due to its essential role in U.S. society. This unequal value resulted in comparatively less time spent on developing Chinese-language literacy. During a collaboration with the Asia Society on a handbook of best practices for Chinese immersion studies, Met (2012) warned: While we know what works in immersion and why it works, we are still learning which components of this type of teaching can be applied to Chinese instruction.

Conclusion

Empirical studies indicated early pre-literacy development played a vital role in learner literacy proficiency. In a one-way immersion program, sufficient instruction time in a target language should be scheduled from pre-K through first grade. The typical 90/10 split instruction model of a one-way immersion program (with 90% in the target language) was considered beneficial to biliteracy development in later grades.

Research suggested the influence of the dominant language in a society, such as the U.S., was a factor in cross-linguistic transfer. More exposure to the target language was considered necessary to achieve biliteracy in dual language immersion learners. The contrasts between the Chinese character language and the alphabetic languages (e.g., English, French, German, Italian, and Spanish) were noteworthy. As a result, there were no cognates in the Chinese language to connect with English, which was likely to create additional challenges in biliteracy development. Meaning, very little linguistic knowledge transfers from English to Chinese or vice versa. Thus, for optimal learning outcomes (achieving Chinese and English biliteracy), sufficient instruction time should be scheduled to develop second language (Chinese) literacy in one-way dual language immersion programs. If less school time were focused on teaching the Chinese language, Chinese literacy development would be delayed or stalled. Focusing more time on a native language also impacts student ability to develop the second language, and might affect first language retention and proficiency, especially for younger students.

To develop Chinese and English-language biliteracy, for an immersion program to succeed, it appeared that equal instruction time should be dedicated to each language. Very few studies were conducted to date explored the impact of a one-way Chinese immersion program with a 50/50 instruction model on student biliteracy development. Future research could contribute to the sustainability of the one-way Chinese immersion educational practice by investigating whether the 50/50 immersion model is a scientifically feasible model for ensuring Chinese and English biliteracy development.

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Appendix A: Definition of Terms

Additive bilingual education refers to nurturing the native language while in the process of teaching the new target language.

Bilingual education is the use of two languages with varying degrees of application according to a predetermined program.

Bilingualism involves being in a position to fluently apply two languages within the process of communication.

Biliteracy is the ability of a person to use two languages, demonstrating mastery of both.

Full immersion refers to the immersion model whereby 100% of instruction is in the immersion (target) language in lower grades from pre-Kindergarten to first grade, including read and write in the target language. Then the instruction time in the target language drop to 80% in the 2nd grade and add 20% English instruction, and gradually decrease to 50% by 5th grade.

One-way immersion is a type of dual language learning program in which all or most of the students are native English speakers. Instruction is given in both the native language and the target language.

Partial immersion refers to an approach whereby half of the teaching time is conducted in a foreign language, the target immersion language. Throughout primary school, this percentage remains consistent. Reading is taught in both the first (native) and second (target) languages. Each class has two teachers when possible: one teaches in the native language and the other in the target language.

Partner language a target language (apart from English) in dual language immersion programs. The team is interchangeable with 'partner language' in language immersion programs.

Subtractive lingual pays less attention to the native language while teaching a target language. Thus, individuals may lose components of native language.

Target language is the language a learner strives to acquire through educational objectives. The term is interchangeable with 'partner language' in language immersion programs.

The first language (L1) or native language is the language an individual is exposed to since birth and acquires naturally in their environment (first language acquisition).

The second language (L2) is acquired through intentional learning. In most cases a second language is a foreign language, but it may be a family language that was rarely used and was, therefore, not acquired at an early age.

Two-way immersion refers to the integration of native English speakers and those students who speak the target language in the same classroom ideally about 50% of each group. The instruction time splits in two languages (English and the target language). The amount of time in the target language is similar as used in the full immersion programs. In theory, the two-way immersion provides opportunity for English speaking students to learn the target language while continuing to develop their English skills. The target language speakers learn English while becoming proficient in their native language.

Appendix C

ARTIFACT 3: GOVERNOR WORLD LANGUAGE INITIATIVE POLICY

Introduction

In an increasingly connected world, learning a second language is becoming increasingly important. In 2011, the then Governor of Delaware, Jack Markell, publicly addressed the pressing issues that students lacked second language skills and proposed a world language expansion plan for Delaware students. As a bilingual educator, I applaud the Governor's initiative and regard him as a visionary leader promoting world language education. Thus, I selected his initiative statement for this policy analysis project.

In his world language expansion plan, the Governor clearly stated the goal for the initiative to ensure that future generations of Delaware students have the language skills necessary to succeed in a global economy that is constantly changing both at home and around the world.

The Governor further explained his rationale for his initiative stating, Delaware public schools currently do not begin teaching foreign languages until high school. Only a few students can begin learning a language in middle school, and even fewer have any experience learning a language in elementary school. The Delaware students are considerably behind their Asian and European peers who begin learning additional languages at the age of five (Governor's world language initiative, 2011).

In terms of world language education, not only Delaware students were left behind. According to National k-12 Foreign Language Enrollment Survey Report (2017) conducted by the American Councils for International Education, American Council for the Teaching of Foreign Languages, and Center for Applied Linguistics, there were only

less than 20 % of the k-12 population enrolled in foreign language courses in the US

Please see Table 1 below,

Table 1

Foreign Language Enrollment in the U.S.		
Major Languages	**Enrollment**	**Percentage**
Arabic	26,045	0.24%
ASL	130,411	1.23%
Chinese	227,086	2.13%
French	1,289,004	12.12%
German	330,898	3.11%
Japanese	67,909	0.64%
Latin	210,306	1.98%
Russian	14,876	0.14%
Spanish	7,363,125	69.21%
Total	10,638,282	100.00%

European countries drastically outpace the US in foreign language learning, with a 92% k-12 student population enrollment rate. The United States is falling behind many other countries, including China. The Chinese compulsory education system requires students to learn English starting in 3rd grade. Approximately 400 million Chinese people are learning English, which is more than the entire population in the US. According to the 2017 International and Foreign Language Education Overview released by the Department of Education, more than 90 percent of Americans do not speak a second language. 75 percent of the world's population do not speak English, and 95% of the

world's customers are outside the United States. It is estimated that one out of five American jobs is related to international trade.

The numbers indicated above paint a vivid picture that our future students were placed in a disadvantaged position to compete in the 21st-century global market without second language skills as a result of American schools failing to stress the importance of world language education. Research findings indicate that lack of foreign language learning in public schools is a threat to the US economy and military security; however, learning a second language is not a national requirement in the US public school system, creating a systematic stigma around world language education in elementary schools.

With the increased importance of global competence in the 21st-century global job market, language skills other than English have become imperative for future generations to succeed in a rapidly changing society and world. International Foreign language education guidelines from the US Department of Education encourage students to learn "less-commonly taught languages," such as Arabic or Chinese, as one of the competitive priorities in promoting the learning of languages other than English for public school students.

Purpose

The purpose of this paper is to examine the potential academic and personal benefits the Governor's initiative could add to the success of the Delaware students in their future.

The following research questions will be discussed with the curriculum framework by Schiro 2013.

1.   What is the curriculum ideology this initiative reflected regarding

education objectives and purpose?

2.   How can this initiative be reviewed by the curriculum scholars in the

modern era of the 21st century?

3.   Should schools train students with World language skills for the 21st-

century global market?

It is important to note that the world and society we live in today is rapidly

evolving and drastically different culturally and linguistically than the time most of the

current educators and school administrator lived. As a result, the education system is

under a fierce demand for changes to meet the global market's needs in the 21st century.

As Dennis Van Roekel stated, *the President of the National Education Association*

(2010);

The 21st century isn't coming; it's already here. And our students have the opportunity
and challenge of living and working in a diverse and rapidly changing world. Public
schools must prepare our young people to understand and address global issues.
Educators must re-examine their teaching strategies and curriculum so that all students
can thrive in this global and interdependent society**.** (p.1)

As public-school educators and leaders, it is imperative to understand the new

demands on public education for students to succeed with the skills they need for an

increasingly interdependent global society. One of the 21st-century skills is identified as

global competence by education scholars and policymakers. Proficiency in foreign

languages to enhance cross-cultural communication skills is one of the four essential

elements defined as global competence (Van Roekel, 2010).

Analysis
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According to curriculum theories discussed in Schiro 2013, four curriculum ideologies were identified as Scholar Academic, Social Efficiency, Learner-Centered, and Social Reconstruction. Despite the four curriculum theories and ideologies overlapping in many ways, each ideology holds a doctrine vision on the value of public education in the US.

In this analysis, I will examine the purpose/aims of education of these ideologies and attempt to identify the similar vision reflected from the Governor's world language initiative. I hope that it will lead us to findings of the benefits that this initiative ultimately brings to the future of Delaware students.

In comparing the purpose of each curriculum ideology discussed in the book "curriculum theory' (Schiro, 2013), the author strategically constructed a fun way to identify the differences by setting up a play with four teachers. Each teacher played a role representing different beliefs of the four ideologies by naming each respectively as SE (Social Efficiency), SA (Scholar Academic), SR (Social Reconstruction), and LC (Learner-Centered). The following is a brief of their argument statements on the position each holds on the purpose of education:

> *SE: We provide children with the skills necessary to become efficient, constructive members of our democratic society.*
> *SA: We enable students to obtain academic excellence by acquiring the content knowledge of the school curriculum.*
> *LC: We facilitate children's growth so that they can self-actualize and reach their full human potential.*
> *SR: We help kids learn the knowledge, skills, and values that will enable them to contribute to building a more just and fulfilling society for all of its members. (pp.203-p204)*

From reviewing the summary above, it is not difficult to agree that the purpose of the Governor's initiative very much shares the position of Social Efficiency to "provide children with the skills necessary to become an efficient member of the society." The Governor strongly believes that language skills other than English would provide an advantage for Delaware students successful in the multilingual and multicultural global society of the 21st century.

As Schrio pointed out, the Social Efficiency ideology was initially introduced in 1913 by Franklin Robbitt due to the demands of the industrial society in the early 20th century. He believed that the fundamental responsibility of education was to prepare students for social needs above all. As he explained,

> The ideal of social service is rapidly becoming the cornerstone of faith in every department of human affairs-in none certainly more than in the field of education. In this service, 'social efficiency is becoming the chief watchword (Bobbitt, 1918). (p.55)

In the 21st century, Social Efficiency ideology continues to influence education. The focus on training a productive industrial workforce in the 20th century has shifted to meeting the needs of the global marketplace and economy of the 21st century.

Schiro reassured us by stating, "According to the Teaching Commission (2004), the goal, as before, is to help children learn "to become successful, contributing citizens," because "around the world . . . the most vibrant and stable economies draw their strength from a well-educated, highly skilled citizenry;" "in a competitive global economy, all citizens must continually race to obtain new, higher skills" for a "highly skilled citizenry;" and "student achievement . . . is directly related to . . . national economic growth." (pp. 12–14) (p.79)

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Governor Markell echoed the goal of education stated above in his World

Language Expansion initiative by commenting that Delaware graduates who enter the job

market without the ability to speak another language (in addition to English) are at a

significant disadvantage. He further emphasized; all Delaware citizens should understand

that learning another language is a crucial skill for success in the global marketplace of

the 21st century (Governor's world language initiative, 2011). Furthermore, Governor

proposed a detailed, articulated K-12 world language learning plan in his initiative,

> Delaware students will begin their study of either Mandarin Chinese or Spanish in
> an elementary immersion program in Kindergarten and continue language study
> into middle school. These students will be able to achieve Advanced Placement
> credit by the ninth grade. They will be encouraged to begin the study of an
> additional world language such as Arabic that could also culminate in extra
> Advanced Placement credit by graduation. Delaware students may also be able to
> participate in dual-credit options with Delaware higher education institutions to
> further their language abilities and enter college with several world language
> credits that could easily count toward a minor or major in the language (p.1).

This proposal revealed the most influential research approved, second language

learning model of the immersion program. His proposal demonstrated a solid research-

supported pedagogical approach to ensure the sustainability of the program instead of a

superficial political slogan. The proposal is specifically designed to start a second

language learning program in Kindergarten or first grade in order to have optimal

learning outcomes. According to the Critical Period Hypothesis, there was a critical

period for second language learning before puberty. Language learning becomes more

difficult once learners have passed this period due to changes in the brain and cognitive

processes. Early language learning is essential for maximizing young learners' language

learning abilities (DÖRNEI, 2009). In short, the sooner, the better.

Numerous researchers and scholars have historically recorded the benefits of learning world languages other than English over the years. Additionally, to enhancing your language proficiency and cultivating cultural awareness, learning another language has been shown to benefit your intelligence, memory, concentration, and even lower your risk of dementia and Alzheimer's Disease (BBC News 2014).

In sum, the Governor's world language initiative provides Delaware students a valuable opportunity to develop global competence with other language skills upon graduation from high school and continue to college with earned language credit through the dual enrollment program. The ultimate goal is to improve students learning outcomes and prepare them to become constructive and productive citizens with additional language skills to succeed in the interconnected global society and world.

Conclusion

As we have discussed so far, the Governor's initiative statement is only in its proposal phase. Without the implementation action, Delaware students will not be able to take advantage of this valuable learning opportunity. The goal of this initiative will not be achieved as the Governor intended. However, simply adopting a new policy is just the starting point. A complex set of actions must unfold from reaching a consensus of all stakeholders, the buy-in of the community to transition changes into practice in the classroom, schools, and district communities, and ultimately to translate the changes by the policy into meaningful improvement for students' academic achievement and personal growth. Without careful, strategically planned action steps, this promising world language initiative could never become a reality, or if only partially carried out, will be for the superficial political purpose. Therefore, I hope the stakeholders and community

are as passionate as the Governor is to embrace the initiative with a strategic action plan

and long-term commitment for the best future of generations of Delaware students

Reflection

This project offered me another opportunity to learn about the four-curriculum

ideology in a relatively more thorough approach. Identifying Social Efficiency as the

most identical theory of the Governor's initiative also led me to ponder the purpose of the

compulsory education system I experienced in China. I was struck by the similarity of the

guiding principle in deciding whether public education should take responsibility for

social efficiency for the society the citizen lives in and belongs. As we all (hopefully)

would agree, there are strong links between the nature of education in a country and its

political system. As China was a socialist country, Social Efficiency was the purpose of

the education system in China. Schools and colleges were responsible for training

students with functional skills required to supply a productive workforce for the country's

economy to continue flourishing and growing. Upon arriving in the US alone, I soon

realized that I was not equipped with decision-making skills. Influenced by the culture, I

was more dictated by the decision made by the Government, school, or parents regarding

what to learn and how to learn, including career choices. The Government potentially

shapes the ideology of the students by directly influencing their future career direction

through established systems of how students were assessed or evaluated, i.e, the Chinese

college entry exam. The only social upward mobility then was through education as a

social ladder. If you are successful in the system, you would expect positive returns from

your education. However, China has gone through transformative changes in the past

decades with positive outcomes. I hope the new generations have different education experiences than I had.

Nevertheless, there are pros and cons in every education system regardless. In my personal opinion, politics and political systems do play a role in deciding the purpose of current education and schools' educational responsibilities. Therefore, I hope the current Governor of Delaware will continue the legacy of the former Governor's world language initiative to benefit Delaware's next generation and beyond.

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Appendix D

ARTIFACT 4: PROPOSED PROGRAM EVALUATION MATRIX

	Logic Model Component	Evaluation Questions	Indicators	Targets	Data Source	Data Collection	Data Analysis
Strategies and Activities	Promotion/Recruitment	In what ways was the program information promoted to district communities to recruit potential participants?	Implementation of promotion and recruitment of the program	Fidelity of implementation by September 2021	Implementation Rubric	Implementation rubric administered semi-annually	Rubric data analyzed for evidence of promotion/recruitment effort
	Curriculum adaption	In what ways was the Chinese curriculum developed and implemented?	Implementation of Chinese curriculum	Fidelity of implementation by September 2021	Implementation Rubric	Implementation rubric administered quarterly	Rubric data analyzed for evidence of curriculum implementation
	Teacher Professional Development	In what ways was the teacher professional development implemented?	Implementation teacher professional development	Fidelity of teacher PD implementation by September 2021	Implementation Rubric	Implementation rubric administered semi-annually	Rubric data analyzed for evidence of teacher PD implementation
	Assessment	In what ways was the students' assessment data disseminated and utilized?	Implementation practice of using assessment data to improve instruction for enhancing students' learning	Fidelity of implementation of using assessment data by September 2021	Implementation Rubric	Implementation rubric administered semi-annually	Rubric data analyzed for evidence of utilizing assessment data

	Logic Model Component	Evaluation Questions	Indicators	Targets	Data Source	Data Collection	Data Analysis
	Leadership Development (LD)	In what ways was leadership development provided and implemented?	Implementation of leadership development strategies and activities	Fidelity of implementation by September 2021	Implementation Rubric	Implementation rubric administered quarterly	Rubric data analyzed for evidence of leadership development
	Parent Involvement	In what ways was the parent involved and support developed for the Chinese immersion learners?	Development and implementation of parent support for the Chinese immersion learners	Fidelity of implementation of parent support for Chinese immersion learners by September 2021	Implementation Rubric	Implementation rubric administered semi-annually	Rubric data analyzed for evidence of parents' support development
Early and Intermediate Objectives	Increased district access to information on program design & goals	To what extent did access to information on program design & goals for districts increase?	Number of information sessions provided for the district community	By September 2021, program information sessions being provided to all the 19 school districts	Program records of information session provided	Quantitative data will be collected in September, 2021on the number of sessions offered	Descriptive statistics on the number of sessions
	Increased number of program applications	To what extent did the number of program applications increase?	Number of program applications	By September 2021, 50% of the 19-school district submitted one program application	Program records of application received	Quantitative data will be collected in September, 2021on the number of applications received	Descriptive statistics on the number of program applications
	Increased enrollment of students in the program	To what extent did the student enrollment in the program increase?	Number of the student enrolled in the program	By September 2021, student enrollment will reach an average 85% capacity	Program records of students' enrollment	Quantitative data will be collected in September, 2021on enrollment numbers	Descriptive statistics on the number of enrollments

	Logic Model Component	Evaluation Questions	Indicators	Targets	Data Source	Data Collection	Data Analysis
Early and Intermediate Objectives (continued)	Increased student participation in the program	To what extent did the student participation in the program increase?	Number of participating students in the program	By September 2021, the student acceptance rate to participate will reach 100%	Program records of students' participation	Quantitative data will be collected in September, 2021on numbers of students' participation	Descriptive statistics on the number of students' participations
	Increased teacher access to Chinese curriculum	To what extent did teacher access to the Chinese curriculum increase?	Number of training sessions on Chinese curriculum provided and curriculum resource added on Schoology	By May 2022, all the 3-training sessions offered on Chinese curriculum and 3 resources updates on Schoology	Records of the training provided on the Chinese curriculum	Quantitative data will be collected in May 2022 on training sessions and resource updates on Schoology	Descriptive statistics on the number of training offered & resource updates
	Increased teachers use of Chinese curriculum	To what extent did teachers' use of the Chinese curriculum increase?	Number of teachers reporting use of Chinese curriculum	By May 2022, 90% of the teacher reporting use of the Chinese curriculum	Survey of teachers' curriculum use	Teachers will complete the survey in May 2022	Data will be analyzed using descriptive statistics of survey results for increased use of curriculum
	Improved Chinese curriculum adaption	To what extent did the Chinese curriculum adaption improve?	Number of teacher reporting of improved curriculum adaption reflected by alignment of lesson plans	By May 2022, 90% of the lesson plans aligned with curriculum content and pacing guide	Program records of teacher lesson plans	Records of teacher lesson plan will be collected & reviewed quarterly	Records analyzed for evidence of improved curriculum adaption
	Increased mentor availability for novice teachers	To what extent did available mentors increase for novice teachers?	Number of available mentors to novice teachers	By May 2022, 100% of the new teacher assigned with mentors	Records of available mentors	Records of available mentors will be collected and reviewed quarterly	Records analyzed for evidence of mentor availability

	Logic Model Component	Evaluation Questions	Indicators	Targets	Data Source	Data Collection	Data Analysis
Early and Intermediate Objectives (continued)	Increased novice teacher contact hours with mentors	To what extent did novice teacher contact hours with mentors increase?	Time mentor spent with novice teachers	By May 2022, mentor contact hours will increase 20% over the base-line of the previous year	Time log of mentor contact hours	Records of mentor's contact hours with new teachers will be collected and reviewed monthly	Records analyzed for evidence of increased mentor contact hours with new teachers
	Increased access for sponsored Chinese teacher PD	To what extent did access for sponsored Chinese teacher PD increase?	Number of available training sponsored by the state	By May 2022, one additional state-sponsored training added over the base-line of the previous year	Program records of training offered 2021-2022	Records of the training provided will be collected and reviewed quarterly	Records analyzed for evidence of Chinese teacher PD availability
	Increased teacher participation in PD	To what extent did the teacher participation in PD increase?	Number of teachers attending PD	By May 2022, 95% of Chinese teacher participate in all the available training	Teacher attendance records	Attendance record of teacher participation in PD will be collected and reviewed semi-annually	Records analyzed for increased teacher participation in PD
	Improved Chinese literacy & content instruction	To what extent did Chinese literacy and content instruction improve?	Record of school administrator's walkthrough and observations	By May 2022, observation reporting of 90% of the teacher's instruction improved	Administrator's observation/walk-through	Observation reports will be collected and reviewed quarterly	Records analyzed for improved instruction
	Improved student academic & language learning	To what extent did the student academic and language learning improve?	Number of immersion students meeting grade-level benchmark	By June 2022, 10 % increase of immersion students meeting grade-level benchmark	State Smarter-Balanced Assessment of ELA & math	Students will complete Smarter-Balanced Assessment April-May 2022	Descriptive data analyzed for evidence of improved learning

	Logic Model Component	Evaluation Questions	Indicators	Targets	Data Source	Data Collection	Data Analysis
Early and Intermediate Objectives (continued)	Increased availability of assessment data to teachers	To what extent did available assessment data to teachers increase?	Number of teachers reporting they have access to assessment data	By June 2022, 90% of the teachers reporting increased access to data over the base-line of the previous year	Survey of teachers' accessibility of data	Teachers will complete the survey in May 2022	Data will be analyzed using descriptive statistics of survey results for the availability of assessment data
	Increased teachers use of assessment data	To what extent did teachers use of assessment data increase?	Number of teachers reporting use of assessment data	By June 2022, 90% of teachers will use assessment data to adjust lesson plans to meet the needs of all students	Survey of teachers use of assessment data	Teachers will complete the survey in May 2022	Survey data will be analyzed for evidence of increased teacher use of assessment data
	Improved tailored instruction to enhance students' learning	To what extent did tailored instruction to enhance students' learning improve?	Number of teachers reporting use of tailored instruction	By June 2022, 90% of teachers will use tailored instruction to enhance students learning	Survey of teachers use of tailored instruction	Teachers will complete the survey in May 2022	Survey data will be analyzed for evidence of improved tailored instruction
	Increased administrators' awareness of program goals and academic benefits	To what extent did the administrator's awareness of program goals and academic benefits increase?	Number of administrators reporting awareness of program goals and benefits	By February 2022, 90% of administrators reporting increased awareness of program goals and benefits	Mid-year administrators' check-in survey	Administrators will complete survey February 2020	Survey data will be analyzed for evidence of increased awareness of program goals

	Logic Model Component	Evaluation Questions	Indicators	Targets	Data Source	Data Collection	Data Analysis
Early and Intermediate Objectives (continued)	Increased administrator's knowledge of program goals and benefits	To what extent did the administrator's knowledge of program goals and benefits increase?	Number of IPAC[21] participants reporting growing knowledge of program goals & benefits	By February 2022, 90% of administrators will increase knowledge of program goals and benefits	Mid-year administrators' growth survey	Administrators will complete the survey in February 2020	Survey data will be analyzed for evidence of increased knowledge of program goals
	Increased leadership support of the program and staff	To what extent did leadership support of the program and staff increase?	Number of trainings offered for program staff led by school or district leaders	By May 2022, bi-monthly training offered to program staff by school or district leaders	Records of training offered to program staff	Record of training offered will be collected and reviewed semi-annually	Records will be analyzed for increased leadership support
	Increased parent access to information on immersion and early language learning	To what extent did parent access to information on immersion and early language learning increase?	Number of information sessions provided to parents on immersion and early language learning	By May 2022, information sessions offered to parents increase from quarterly to monthly	Records of information session offered to parents	Records of information session offered will be collected and reviewed semi-annually	Records will be analyzed for evidence of parent's information session availability
	Increased parent understanding of immersion and early language learning	To what extent did parent understanding of immersion and early language learning increase?	Number of immersion PTA participants reporting understanding of the importance of	By May 2022, 50% of parents will understand what immersion and early language learning about	End of year parents' survey	Parents complete the end of year survey	Survey data will be analyzed for evidence of parents' increased understanding of immersion

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[21] Immersion Principal and Administrator Conference

	Logic Model Component	Evaluation Questions	Indicators	Targets	Data Source	Data Collection	Data Analysis
Early and Intermediate Objectives (continued)			immersion and early language learning				
	Improved teacher-parent partnership	To what extent did teacher-parent partnership improve?	1.Number of parents attending the teacher-parent conference and parent-volunteers 2. Number of parent & teacher reporting forming partnership	By May 2022, 10% higher participation rate of teacher-parent conference and classroom volunteers over the base-line of previous years	1.The attendance record of teacher-parent conference 2. survey of teacher & parents	1.Records of conference attendance 2. parent and teacher complete a survey in May 2022	Records & survey data will be analyzed for evidence of improved parent-teacher partnership
	Increased parent support at home	To what extent did parent support at home improve?	Number of hours parents spent interacting with children learning at home	By May 2021, 50% of parents reporting of providing support at home	Semi-annual Parent-survey	Parent complete mid & end of year survey	Survey data will be analyzed for evidence of increased parent support at home
	Increased student class engagement	To what extent did student class engagement increase?	Number and type of activities students engage in	By May 2022, students' engagement increased 10% over the base-line of the previous years	Administrators observation and walk-through	Observation/walk-through reports will be collected and reviewed semi-annually	Qualitative data analyzed for increased students' class engagement
Long	Increased student's academic	To what extent did student's academic	Students' summative	By June 2022, a 10% increase of	Summative assessment	Students complete Smarter-Balanced	Descriptive data analyzed for

	Logic Model Component	Evaluation Questions	Indicators	Targets	Data Source	Data Collection	Data Analysis
	achievement & biliteracy skills	achievement and biliteracy skills increase?	assessment data on State standardized test and language proficiency performance	immersion students will reach academic and language grade-level benchmark	data on math, ELA and Chinese	and AAPPL Chinese language assessments	evidence of increased student's academic achievement, language & literacy skills
	Increased students' employability						

Appendix E

ARTIFACT 5: SUMMARY OF BILITERACY DATA

Introduction

Research and studies of language immersion programs have shown that students who receive language immersion education perform as well as or better than their non-immersion peers in English language arts (ELA) and mathematics, regardless of the non-English target language (Lindholm-Leary and Genesee 2014, Steel et al., 2017, Watzinger-Tharp et al., 2018). Nevertheless, language immersion education's effectiveness in developing students' biliteracy in English and the target language receives less attention in the research, particularly with partner/target language proficiency (Burkhauser et al., 2016). Although education stakeholders may emphasize students' performance in ELA and mathematics, one of the primary goals of language immersion education is to produce bilingual and biliterate graduates.

This ELP intends to explore how well the Chinese immersion learners' biliteracy developed in English and Chinese language arts (CLA) by examining proficiency growth trajectories for third to fifth grade and whether program contexts could contribute to students' biliteracy development.

This summary presents four sets of assessment data for analysis: a pair of CLA and ELA assessment data from each school. The average students' scale scores of each grade in CLA and ELA were generated in graphics to show growth over the three school years. Each of the assessment instruments used was introduced and reviewed for background information. The differences and similarities in students' learning outcomes were identified and discussed. Drawing on assessment data of Chinese immersion

learners in these two programs, this summary reports the positive trajectories in English and slower growth in Chinese. Some factors in program contexts could have contributed to the biliteracy development. Furthermore, the limitations in the findings were discussed to explain the study conditions for a better understanding of generalizing the study results.

ELA and CLA Achievement Data for School A

School A: ELA Assessment instrument and results

The state-mandated accountability test for School A was developed by the Smarter Balanced Assessment Consortium (SBAC). SBAC creates CCSS-aligned tests, which measure student achievement and growth of students in ELA and math in grades three to eight and high school. The SBAC tests are computer-adaptive, meaning students are given a more difficult question when they answer a question correctly, allowing them to demonstrate the depth of their knowledge. The questions get easier when students answer questions incorrectly (Smarter Balanced Assessment Consortium (SBAC) n.d.).

Students' assessment results are reported in two primary ways: scaled scores and achievement levels. The scaled score is the students' overall numeric score, indicating the current achievement level designed by SBAC (see Table 1).

Table 1

ELA Scale score ranges for four achievement levels of grades 3 to 8

Smarter Balanced ELA	Level 1	Level 2	Level 3	Level 4
Grade 3	<2367	2367-2431	2432-2489	>2489
Grade 4	<2416	2416-2472	2473-2532	>2532
Grade 5	<2442	2442-2501	2502-2581	>2581
Grade 6	<2457	2457-2530	2531-2617	>2617
Grade 7	<2479	2479-2551	2552-2648	>2648
Grade 8	<2487	2487-2566	2567-2667	>2667

Note: Adapted from Smarter Balanced Organization website.
https://validity.smarterbalanced.org/scoring/

The achievement level descriptors are as follows,

- Level 1- minimal understanding of and ability to apply the knowledge and skills associated with college content readiness.
- Level 2- partial understanding of and ability to apply the knowledge and skills associated with college content readiness.
- Level 3- adequate understanding of and ability to apply the knowledge and skills associated with college content readiness.
- Level 4- a thorough understanding of and ability to apply the knowledge and skills associated with college content readiness (SBAC 2013).

The four levels can be described qualitatively in terms of "(level 1) below target; (level 2) approaching, (level 3) proficient, (level 4) advanced". As shown in Table 1, scores higher than 2489 for third graders qualify to be in the advanced-level 4; subsequently, scores greater than 2532 for the fourth and 2581 for the fifth grades.

Figure 1 below displays the average ELA scores of immersion learners over three grades from 2017 through 2019.

Figure 1

School A: Average ELA scale score for 3rd through 5th grades

153
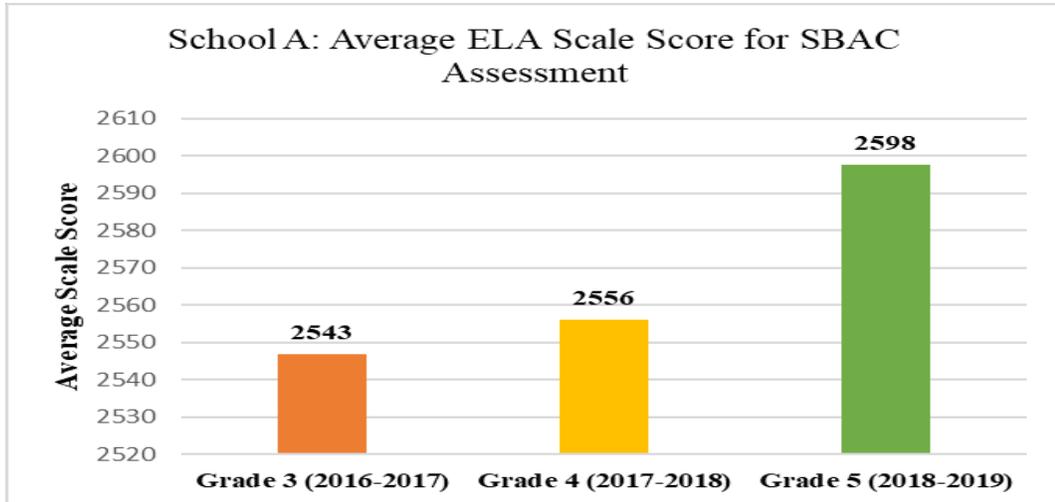
Based on their scaled scores, students fall into one of the four achievement levels (see Table 1).

Figure 2 below displays students' ELA average scores in each grade, represented on the blue line. The baseline score for level 4-advanced by SBAC is on the orange line.

Figure 2

School A: ELA average scores compare with target scores
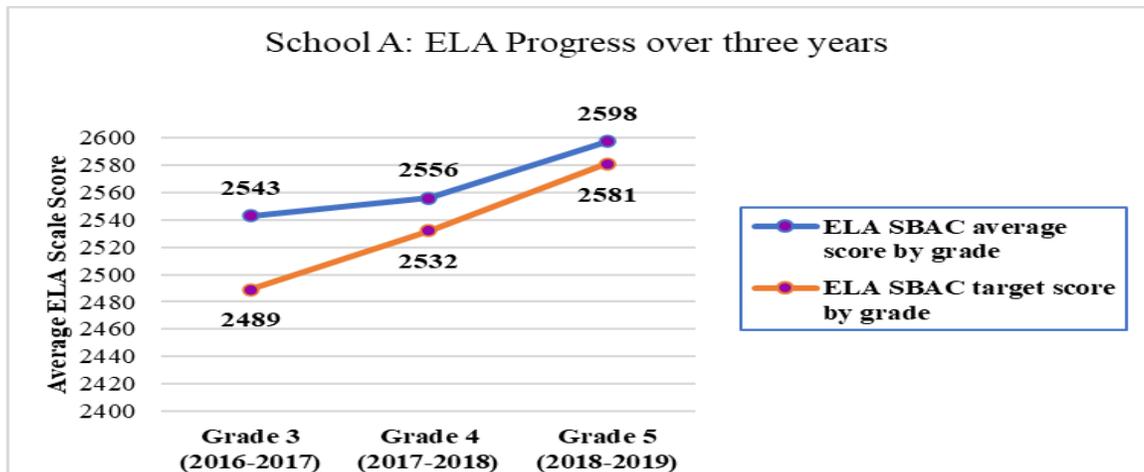
The data in Figure 2 showed positive trajectories in ELA growth. The test score of the third graders was 54 points higher than the advanced level 4 baseline score, 24 points

higher for the fourth graders, and 17 points for the fifth graders. It might be helpful for program teachers to be aware that it seemed the number difference became smaller as the rigor of the curriculum increased. Adjustment in literacy instruction might be necessary to match up with the severity of the curriculum.

The Chinese immersion (CI) program at School A is a strand model within a school[22], with only two classes of CI students in each grade. Table 2 displays the enrollment information of School A from 2017 to 2019. The total enrollment increased from 708 to 734, with an average of 724 students attending.

Table 2

School A enrollment information 2017-2019

Enrollment Information for School A									
Year	**Caucasian**	**African American**	**Asian**	**Hispanic**	**American Indian**	**Pacific Islander**	**Two or More Races**	**Not Specified**	**Total**
2017	397	173	44	42	1	2	49	0	708
2018	405	159	44	61	3	2	60	0	734
2019	415	159	45	52	3	2	56	0	732

Note. Adapted from National Center for Education Statistics (NCES), U.S. Department of Education (US DOE n.d.)
https://www.schooldigger.com/go/DE/schools/0018000038/school.aspx?t=tbStudents#aDetail

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[22] Strand model indicates only partial of the school student population enrolled in the program, not a whole school model where the entire school participates in the program

There were about 40 immersion students in each grade, totaling 200 students from grades one to five. Immersion students represented approximately 28% of the entire school population.

School A immersion program is open to all students. Figure 4 displays the demographic characteristics of the two groups of students. The demographics of CI students and non-immersion were not much different.

Figure 4

Demographic comparison chart of Chinese immersion and non-immersion in School A

School A: Chinese immersion demographics (2017) n=37
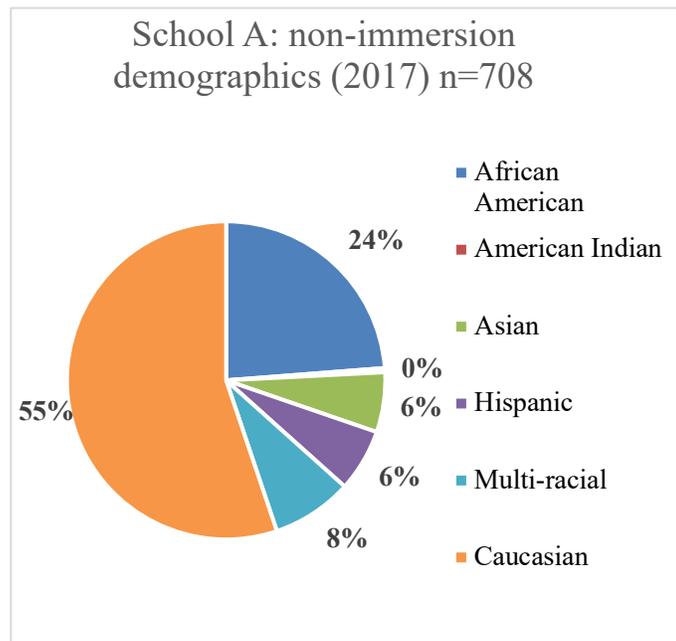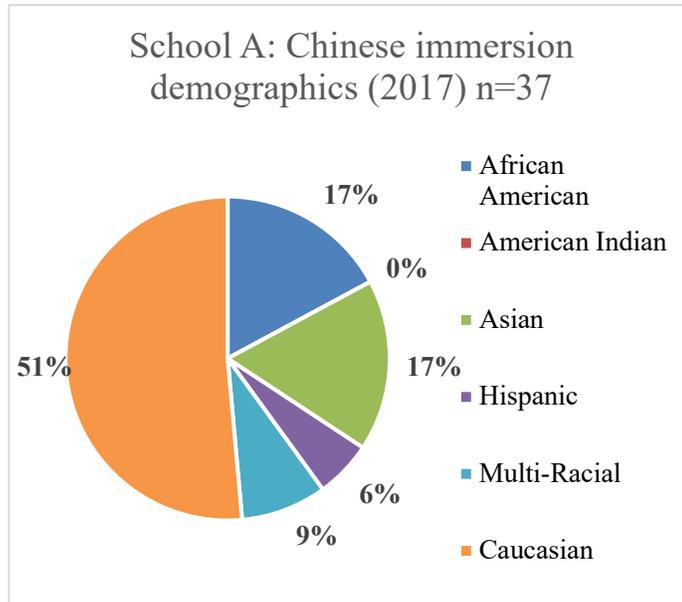
The two pie charts are identical in the distribution of most ethnicities except the Asian population. There are 11% higher representations of Asians in CI than in non-immersion. About 24% of African Americans were in the non-immersion, which is 7% higher than the immersion group.

As a strand within a traditional school model at School A, about 200 immersion students attend the same school with more than 500 of their non-immersion peers. Additionally, the two groups share very similar demographics. It would be interesting to see how School A immersion students performed compared with their non-immersion grade-level peers. Figure 3 illustrates the average scores of the immersion students' side by side with their peers in the same school and the state.

Figure 3

ELA Average scores by school and state over the three grades
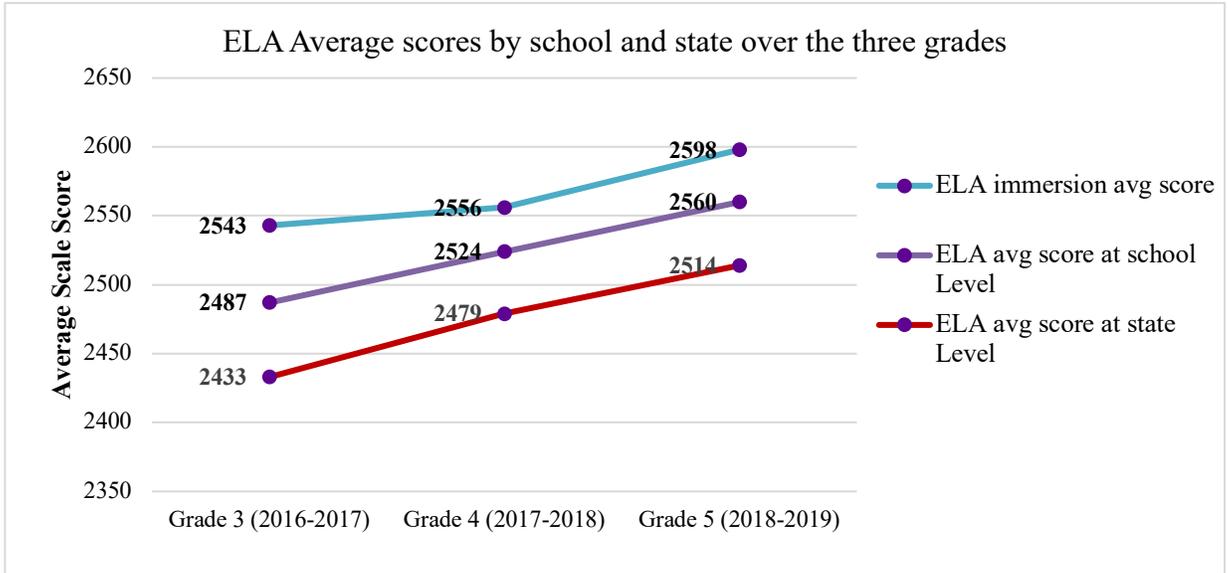
Each year, DDOE publishes the ELA average scores of each grade at the state level and each school across the state. Based on the DDOE published data, Figure 3 displays an overview of the ELA average scores of three groups of students; the blue line represents immersion students, the yellow line for the school, and the red for the state. Immersion students' overall average scores in grades three to five were 90 points higher than their peers statewide and 42 points higher school-wide.

In order to determine whether there were significant differences between immersion and non-immersion students' test scores, an inferential statistic T-test was performed (Table 3). Since individual ELA data at the state level were not available on DOE's website, the T-test for the two groups of immersion and non-immersion at the state level was not conducted.

Table 3

T-test results

Group Statistics

ELA score	Group	N	Mean	Std. Deviation	Std. Error Mean
Scale Score	1	104	2565.89	65.998	6.472

158

| | | 2 | 368 | 2511.91 | 87.336 | 4.553 |

Independent Samples Test

| | | Levene's Test for Equality of Variances | | | | |
		F	Sig.	t	df	Sig. (2-tailed)
Scale Score	Equal variances assumed	8.800	.003	5.847	470	.000
	Equal variances not assumed			6.822	215.369	.000

Note. The abbreviations *M* and *SD stand for mean and standard deviation, respectively.*

A two-sample T-test was performed to compare ELA scores between immersion (*n*=104) and non-immersion students (*n*= 368) in School A.

In Table 3, immersion group, code 1 (M = 2565.89 SD = 65.998) and non-immersion group code 2 (M = 2511.91, SD = 87.336); t (470) = 5.847, p <.003. As *P*< .05, it is generally considered statistically significant. It is evident that immersion students perform better in ELA than non-immersion peers, not by chance or coincidence.

As emphasized earlier, biliteracy is one of the primary goals of language immersion education. The ELA data sufficiently clarified that CI learners had met their grade-level expectations in English. However, this represents proficiency markers in ELA and provides benchmark information to review and analyze assessment data for CI learners associated with the biliteracy goals.

School A: Chinese language arts (CLA) assessment instrument and results

The summative assessment for CLA in School A is the Assessments of Performance toward Proficiency in Languages (AAPPL). AAPPL is designed by the American Council on the Teaching of Foreign Languages (ACTFL), which is a not-for-profit national organization dedicated to the improvement and expansion of the teaching

and learning of all languages at all levels of instruction (Language Testing International (LTI) n.d.)

According to the ACTFL website, AAPPL is a performance assessment of standards-based language learning across the three modes of communication (Interpersonal, Presentational, and Interpretive) defined by the World-Readiness Standards for Language Learning. The AAPPL is comprised of four components and assesses the following four skills,

- Interpretive Listening (IL)

- Interpretive Reading (IR)

- Interpersonal Listening/Speaking (ILS)

- Presentational Writing (PW) (ACTFL n. d.)

AAPPL Scores range from N-1 (low range of Novice) through A-1 (the beginning of the Advanced range). Table 4 illustrates how the AAPPL Proficiency and Performance Scores align with the ACTFL Proficiency Scale (LTI n.d.)

Table 4

AAPPL performance scale and score range

ACTFL Proficiency Scale	ACTFL Performance Range	AAPPL Proficiency Range & Performance Score
Advanced Low	ADVANCED	A-1
Intermediate High		I-5
Intermediate Mid		I-4
Intermediate Mid	INTERMEDIATE	I-3
Intermediate Mid		I-2
Intermediate Low		I-1
Novice High		N-4
Novice Mid		N-3
Novice Mid	NOVICE	N-2
Novice Low		N-1

Note. Reprinted from ACTFL (n.d.) *Scores and reporting.*
https://www.actfl.org/center-assessment-research-and-development/actfl-assessments/actfl-k-12-assessments/actfl-assessment-performance-toward-proficiency-languages/scores-reporting

As shown in Table 4, the three language proficiency levels of novice, intermediate and advanced are categorized into different sublevels. For the novice level, there are four sublevels Novice low N1, Novice mid N2 and N3, and Novice High N4. The intermediate level has five subsequent levels: Intermediate low I1, Intermediate mid I2, I3, I4, and Intermediate high I5.

The grade level proficiency benchmarks for School A are enclosed as Exhibit A. A particular target was set for each of the four language skills (listening, speaking, reading, and writing) based on the attending grade. Listening assessment was not offered yet in School A. The target benchmarks are as follows without listening,

- **Third grade -** Intermediate Low (**speaking**)
  Novice High (**reading**)
  Novice High (**writing**)

- **Fourth grade-**Intermediate Low (**speaking**)
  Intermediate Low (**reading**)
  Intermediate Low (**writing**)

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- **Fifth grade -** Intermediate Mid **(speaking)**
  Intermediate Low **(reading)**
  Intermediate Low **(writing)**

This summary report presents student AAPPL assessment data separately by language skills, speaking, reading and writing.

Figure 5 illustrates how students performed in speaking on the AAPPL assessment, and it contains three charts, each for a single grade as shown.

Figure 5

School A: Interpersonal Listening/Speaking (ILS) proficiency levels from grade three to five

School A: Grade 5 speaking (ILS) proficiency levels (2018-2019) N=36
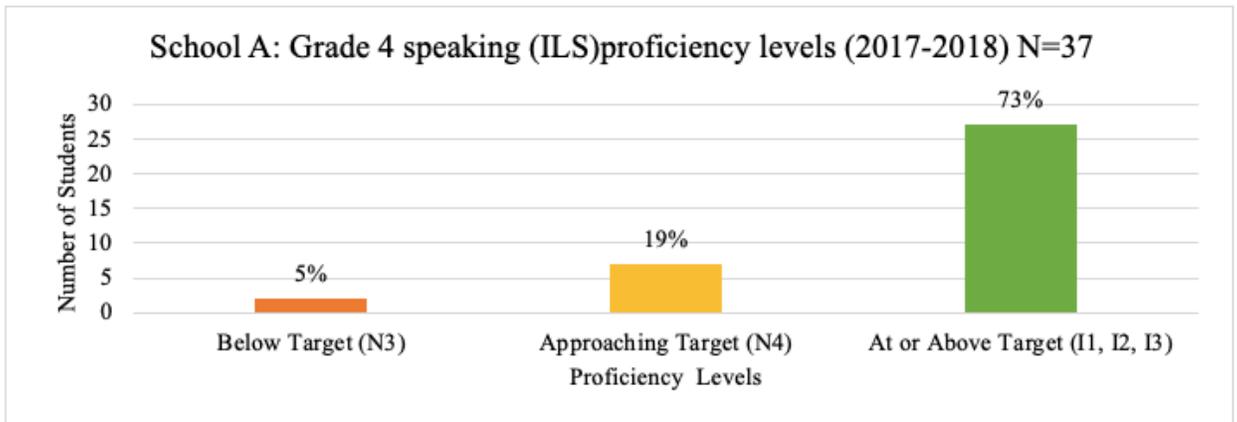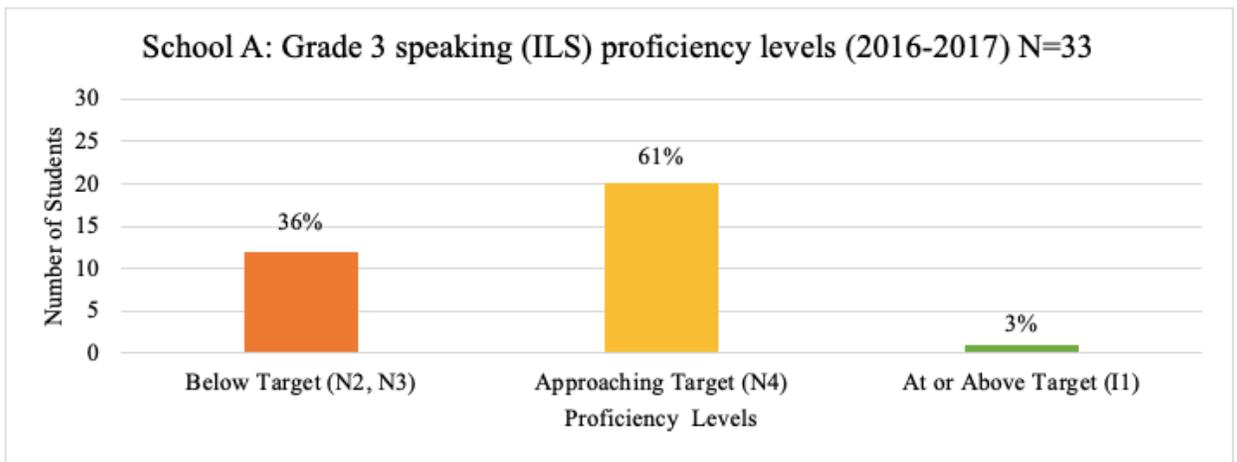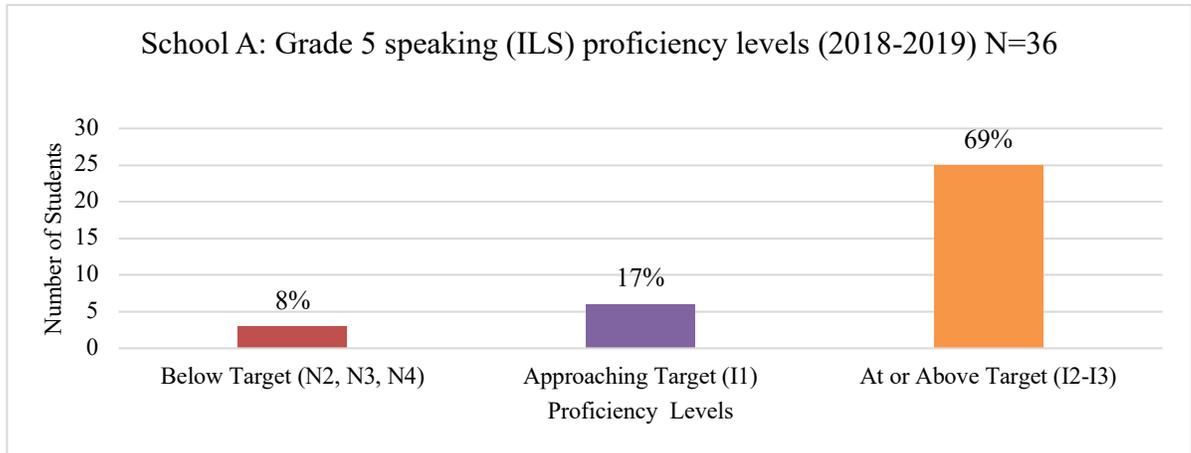
Figure 5 shows the percentage of the students in the three different achievement levels based on the proficiency target:

- Below Target
- Approaching Target
- At or above the Target

In 2016-2017, only 3% (one student) reached the target level of Intermediate Low. The same group performed better in the following year, 2017-2018, in which 73% (27 students) reached the target benchmark, including ten students who exceeded that level. For the fifth grade, 69% achieved the target: Intermediate Mid.

Figure 6 displays the overall progress in speaking from 2016-2017 to 2018-2019.

Figure 6

School A: An overview of students' progress in speaking over three years (2017-2019)

School A: Speaking (ILS) skill progress over three years
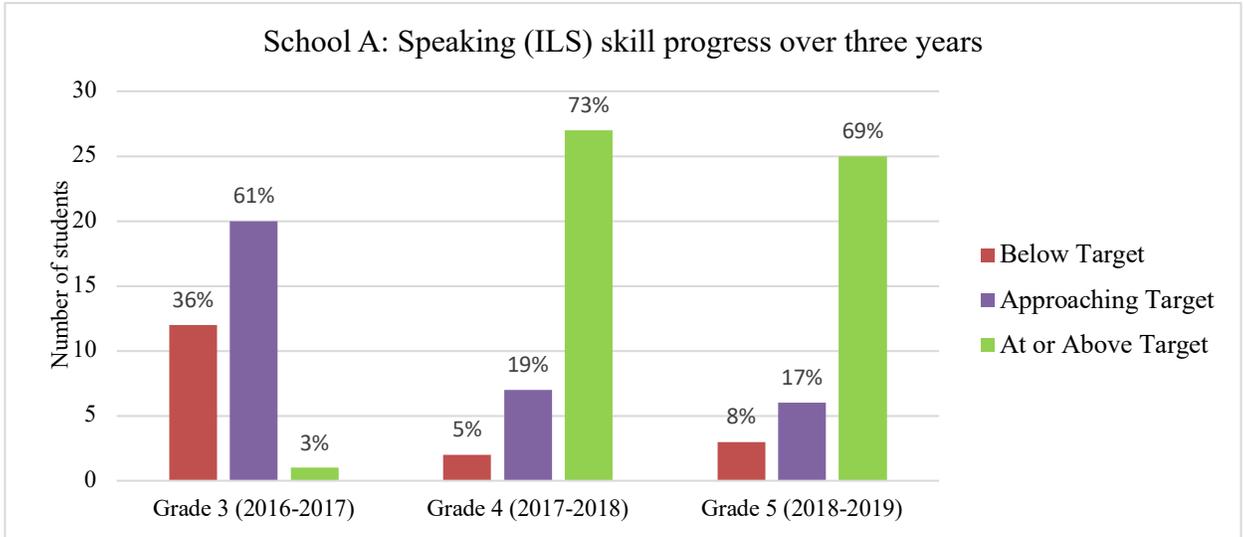
As shown in Figure 6, students made adequate progress in their speaking skills, particularly from third to fourth grade. The percentage of students who performed below target dropped from 36% in third to 5% in fourth grade. By the end of fifth grade, 69% of students were on grade level, although the target percentage should be 80%, as determined by the DDOE.

Figure 7

School A: Students who met the grade-level speaking proficiency target (2017-2019)

School A: Speaking (ILS) proficiency progress towards target level
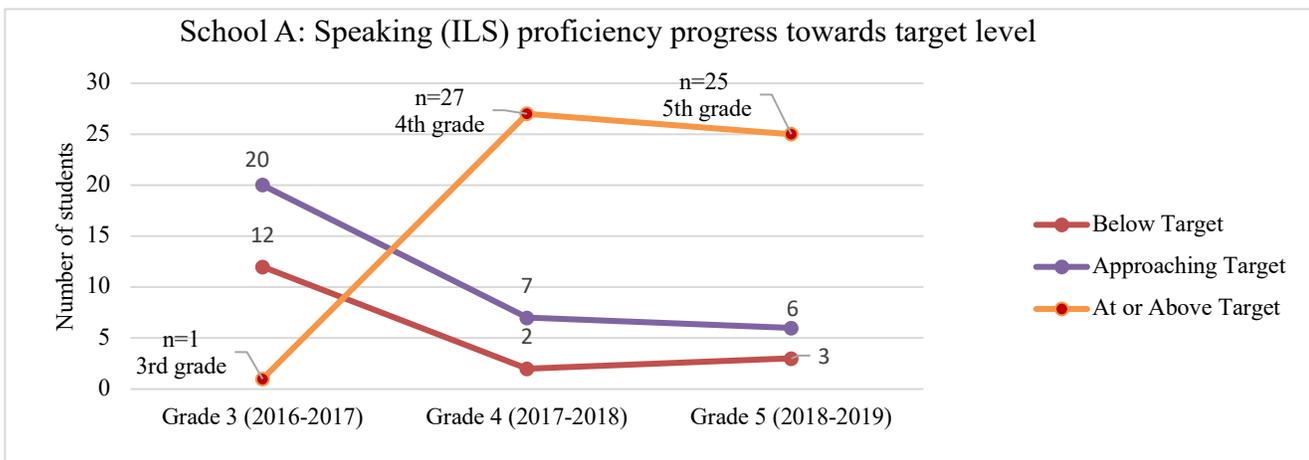
Figure 7 provides a line chart illustrating how students' speaking proficiency progressed from the third through the fifth grades. The green line represents the number of students who met the grade-level target at each grade. There was about a 70% jump (Figure 6) in growth rate from 3%, one in third grade, to 73%, 27 students in fourth grade. Though there were positive trajectories, the abnormal growth pattern creates questions about the performance of third-grade students. Many factors could have contributed; however, the proficiency targets were set the same for both third and fourth grade, which is worth noting. Hypothetically speaking, if the target for the third grade was set up as Novice High, which was lower than the current Intermediate Low, the results could have been 64% of the test takers who would have reached the grade-level proficiency target.

Setting an appropriate academic target could be one of the recommendations or issues to investigate in the future evaluation of the CI program.

Reading proficiency data is reported next. Reading assessment was not offered to the students in third grade. Therefore, the data is available for fourth and fifth grades only.

Figure 8 displays the fourth graders' performance in reading skills.

Figure 8

School A: Students' reading proficiency level in fourth grade (2017-2018)

School A: Grade 4 Reading (IR) proficiency levels N=37

100%

0% **0** **0%** **0**

Number of Students

Below Target (N2, N3)   Approaching Target (N4)   At or Above Target (I1)

Reading Proficiency Levels
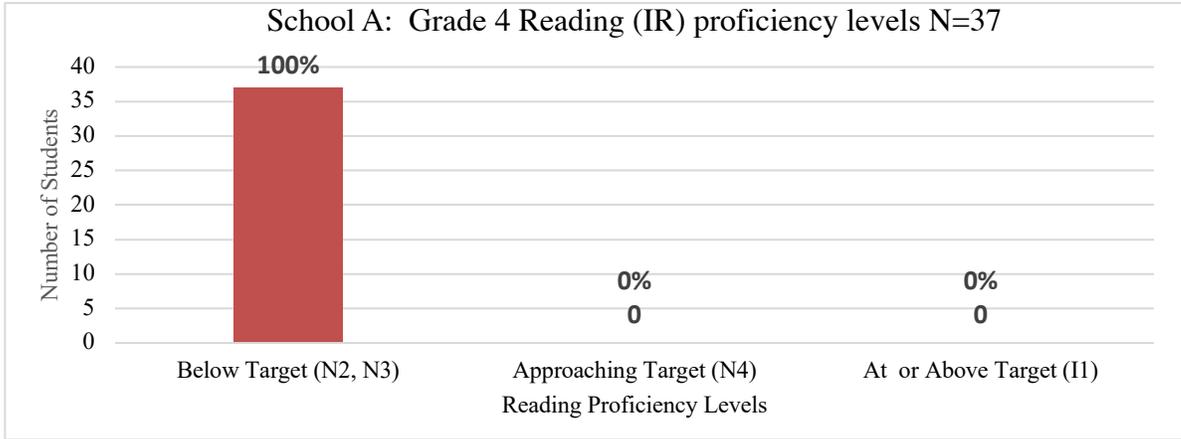
During the 2017-2018 school years, all the CI students scored below the target for reading proficiency (Figure 8). Once again, the reading proficiency target for the fourth grade was the same for the fifth. About 19% of the fifth-graders met the target level of Intermedia Low (Figure 9). The percentage might not add up to 100% (Figure 9) because there were two students labeled as 'Not started' due to an unknown reason, which explains why 94% of the population is represented in this data set.

Figure 9

School A: Students' reading proficiency level in fifth grade (2018-2019)

School A: Grade 5 reading (IR) proficiency level N=36

42% **33%** **19%**

Number of Students

Below Target (N2, N3)   Approaching Target (N4, I1)   At or Above Target (I2-I3)

Reading Proficiency Levels
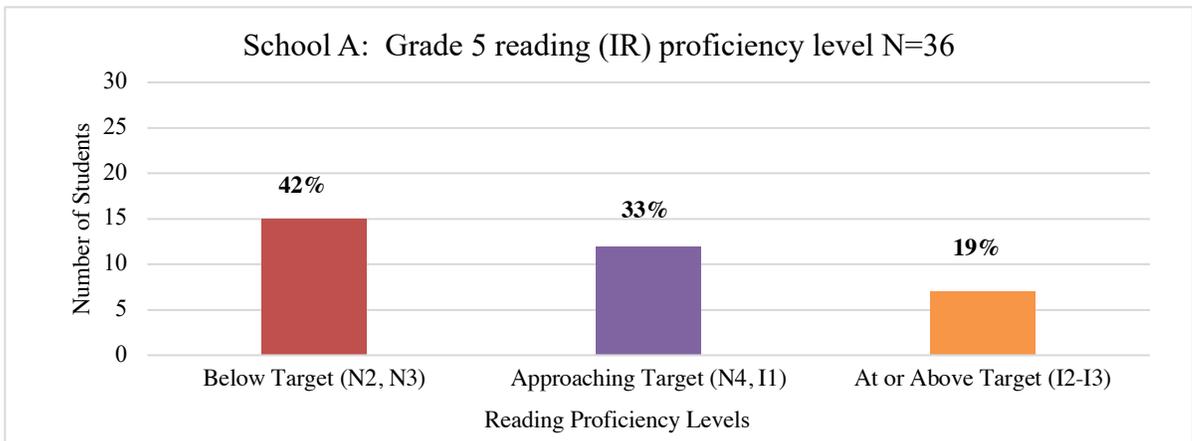
Overall, performance on the AAPPL interpretive reading task was much lower than the target level. Figure 10 indicates that by the fifth grade, only 19% of students performed at or above the grade target level.

Figure 10

School A: An overview of students' progress in reading over 4th and 5th grades (2018-2019)
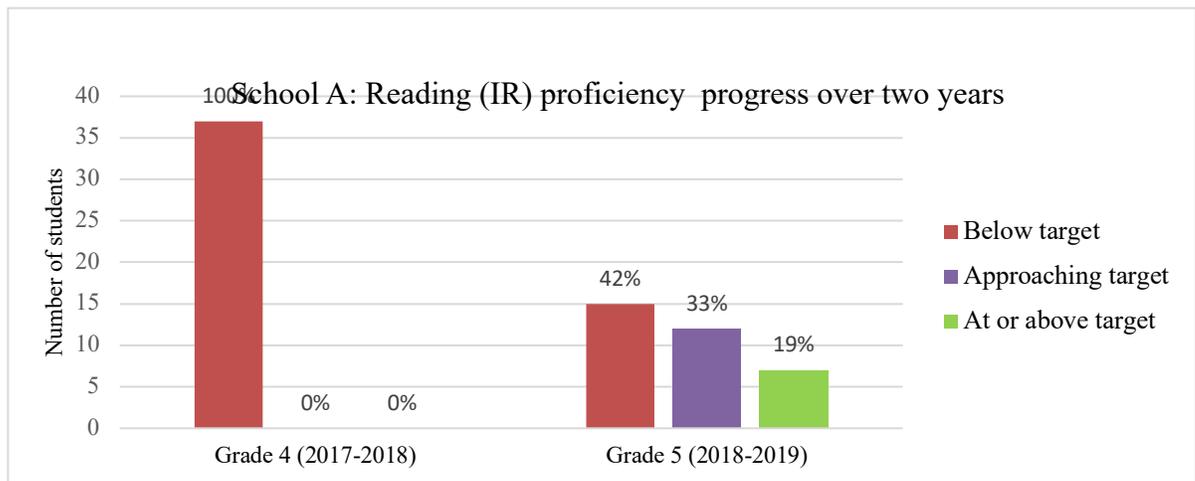
The writing assessment was only offered to the fifth graders of this cohort of students who had taken the speaking and reading in the previous years. Figure 12 illustrates the writing performance of the thirty-six test-takers in 2018-2019. More than half of the students (20 of 36) performed below the target; only five students in the group reached the Intermediate Low target.

Figure 12

School A: Students' writing proficiency levels in fifth grade (2018-2019)

School A: Grade 5 Writing (PW) proficiency levels N=36
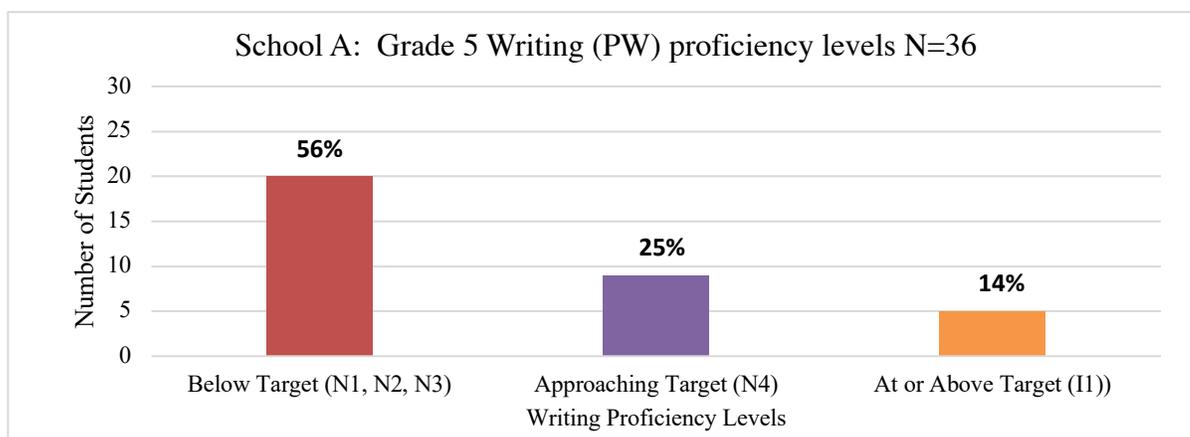
Summary of the assessment data for School A

In summary, the CI students in School A demonstrated their grade-level proficiency in ELA based on the SBAC assessment data collected from the third to fifth grades. They are considered at or above the grade level and outperform their non-immersion peers at the school and state levels. In terms of Chinese language proficiency, not all students met the target levels for proficiency. However, they made adequate progress in gaining proficiency in the three skills identified in the AAPPL summative assessment.

Among the CLA three skills, the strongest is the speaking skill, with a higher rate of 69% of students who have met the grade level proficiency; the weaker skills are reading and writing (see Figure 13). However, the number of the percentage (69%) speaking is still below the percentage target established for the CI program, which should be 80%. Figure 13 illustrates the percentage of students who met the grade-level target in Chinese and English.

Figure 13

School A: An overview of the students who met the target level in CLA and ELA by fifth grade

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School A: CLA (n=36)/ELA (n=33) 5th grade

ELA		88% ELA
CLA Writing	14% CLA Writing	
CLA Reading	19% CLA Reading	
CLA Speaking		69%

0   5   10   15   20   25   30
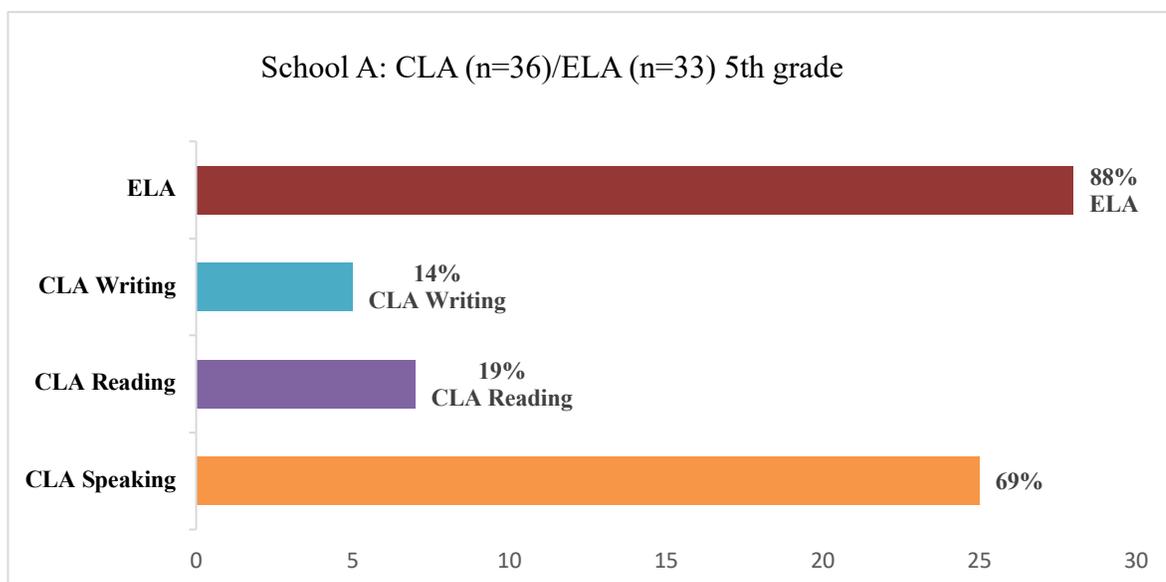
The achievement gap between CLA and ELA in Figure 13 is evident, and the biliteracy goals were not fully achieved. It is impossible to determine the causes of these results with this data. Possible causes might include contextual factors such as school program and curriculum choices, the amount of instruction time dedicated to English and Chinese literacy (and its various components), student motivation, perception of the importance of ELA testing achievement over CLA testing achievement, unrealistic targets, etc. Given this data, it seems that the goal of biliteracy remains challenging to reach.

<div align="center">ELA and CLA Achievement Data for School B</div>

School B: ELA Assessment instrument and results

The state-mandated accountability test for School B was developed by the Partnership for the Assessment of Readiness for College and Careers (PARCC). It is one of two federally funded multistate consortiums designed to develop Common Core-aligned tests to measure students' progress in ELA and mathematics between grades three and 11. The other is the Smarter Balanced Assessment Consortium (SBAC), which

School A uses. Therefore, the two assessments share a similar design of CCSS-aligned tests, and the reporting system mirrors each other.

Students' PARCC assessment results are reported in two primary ways: scaled scores and achievement levels. A scale score is a numerical value that describes a student's performance. A scale score of 750 is the benchmark for college and career readiness on PARCC for reading and mathematics grades three to eight. The PARCC scale scores range from 650 to 850 for all tests (Table 5).

Table 5

PARCC Scale scores and performance levels
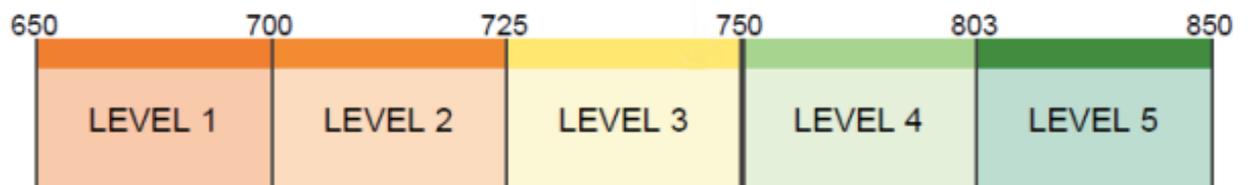
650	700	725	750	803	850
LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4	LEVEL 5	

Note. Reprinted from the document "PARCC Scale Scores and Performance Levels." https://www.montgomeryschoolsmd.org ›

PARCC reporting system divides students' scores into five different performance levels. Based on their scaled scores, students fall into one of the five performance levels, as shown in Table 5. Each performance level indicates how well students met the expectations for their grade level as described below,

- Level 1 – Did not meet expectations.

- Level 2 – Partially met expectations.

- Level 3 – Approached expectations.

- Level 4 – Met expectations.

• Level 5 – Exceeded expectations (Montgomery County Public Schools n.d.)

According to the PARCC scale scores and performance levels shown in Table 5, a scale score of 750 is the benchmark for meeting college and career readiness for ELA from grades three to eight. Figure 14 shows how CI students performed in the ELA assessment. The average score was 742 in the green bar, eight points shy of meeting the benchmark score of 750 for the third graders. The other two grades achieved higher than 750.

Figure 14

School B: Average ELA scale score for 3rd through 5th grades
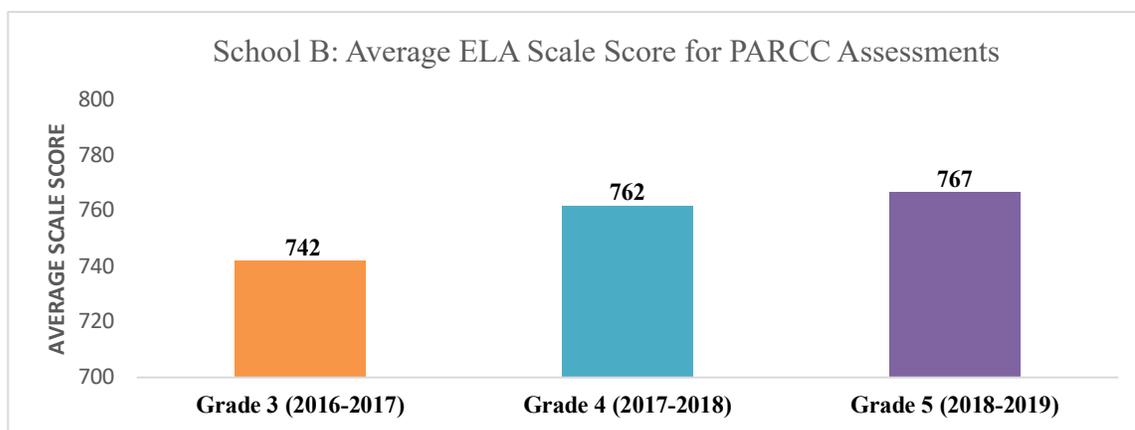
Compared with the benchmark baseline score, Figure 15 shows ELA positive trajectories across the three grades. Students in the third grade showed slower growth compared with the other two grades.

Figure 15

School B: ELA average scores compare with target scores

School B: ELA progress over three years
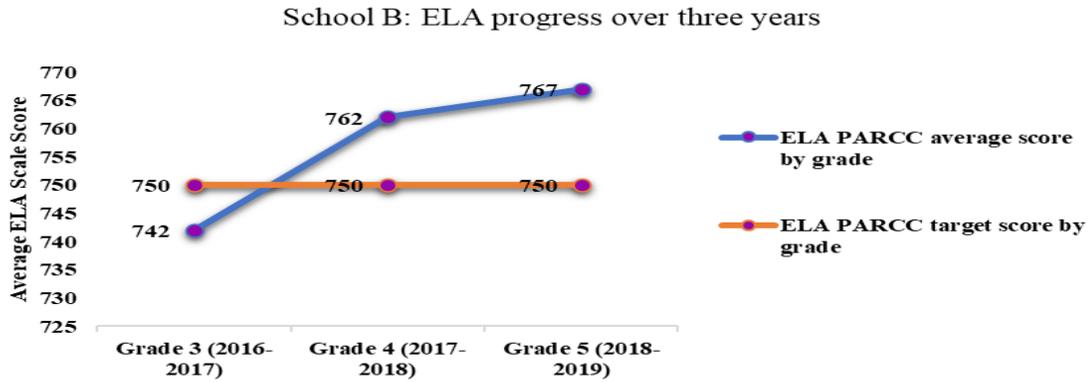
It is worth noting that students in School B had total immersion in Chinese without any English language exposure during their pre-k years. The total immersion without English exposure could help explain why the score of 742 in the third grade is slightly below 750. Nevertheless, the students made adequate positive progress following the third grade and advanced into level 4-meet expectations in grades four and five.

According to the DC Office of the State Superintendent of Education (OSSE), in 2019, students in School B who met or exceeded on ELA of PARCC assessment were about 19% higher than the DC school overall (Figure 15). The same year, School B received a five-star rating of 1-5 from the DC's accountability system. The five-star rating is the highest based on performance measurement across multiple metrics (OSSE, 2021).

Figure 15

School B: 2019 Students' ELA performance compared with the DC overall

English Language Arts

Student performance

2019 Meeting or Exceeding Expectations

School	55.94%
DC Overall	37.15%

0%　　　　　　　　　　　　　　　　　　　　　　　　　　　100%
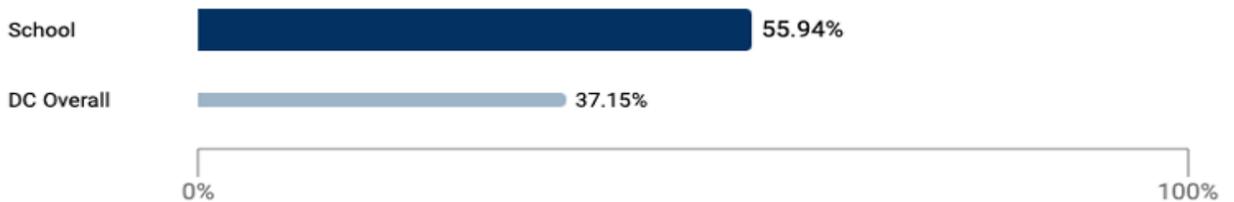
2019 Approaching, Meeting, or Exceeding Expectations

School	81.18%
DC Overall	59.44%

Note. Adapted from the DC school report card by the DC office of the state superintendent of Education (OSSE) https://dcschoolreportcard.org/schools/160-1117/student-achievement?lang=en

School B: CLA assessment instrument and results

The summative assessment for CLA in School B is the STAMP test. The STAMP 4Se (STAMP) was the version of the test used in School B, which is a web and performance-based Chinese language proficiency test for assessing the general language proficiency of students in grades three to six. STAMP stands for Standards-based Measurement of Proficiency, created by Avant Assessment LLC, a company that offers online language proficiency tests in more than 40 languages.

STAMP literature states the benchmark scales align with the K-12 performance guidelines, the proficiency levels, and sublevels described in the American Council on Teaching of Foreign Languages (ACTFL) (e.g., Novice High, Intermediate Mid). According to the information provided on the Avant Assessment website, STAMP result ratings consist of the primary levels Novice, Intermediate, and Advanced and the

sublevels Low, Mid, and High (Avant Assessment, 2015). Table 6 displays the three

primary proficiency levels, the nine sublevels by ACTFL, and the numeric scores system

used by STAMP to refer to the different proficiency levels.

Table 6

STAMP benchmark scale correlation with the ACTFL scale

STAMP Level Keys

Note. Reprinted from the Avant Assessment website.
https://avantassessment.com/stamp-benchmarks-rubric-guide

For School A, the same benchmark scale by ACTFL was used in assessing

students' CLA performance. Although the names of the two CLA tests are different, they

both are web and performance-based, and the same ACTFL measurement benchmarks

were used. They both used test-taker performance on language tasks in four modalities

(listening, speaking, reading, and writing) as evidence of students' language proficiency.

The student's language proficiency levels in these two tests could be compatible.

School B: CLA assessment results

According to the curriculum coordinator in School B (June 8, 2022), the

proficiency benchmarks for all three language skills (speaking, reading, and writing) are

as follows;

- **Third grade -** Novice high (**speaking, reading, writing)**

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- **Fourth grade**- Intermediate low (**speaking, reading, writing**)
- **Fifth grade** -   Intermediate low (**speaking, reading, writing**)

The CLA assessment results were reported by grade in this summary with three language skill proficiencies. Based on each student's score, students fall into three proficiency categories: below target, approaching the target, and at or above target. Figure 16 contains three grades' assessment results in a separate chart.

Figure 16

School B: Students CLA proficiency levels in speaking, reading, and writing in grades 3 to 5

School B: Grade 3 language proficiency levels n=50 *

School B: Grade 4 language proficiency levels n=72

School B: Grade 5 language proficiency levels n=62
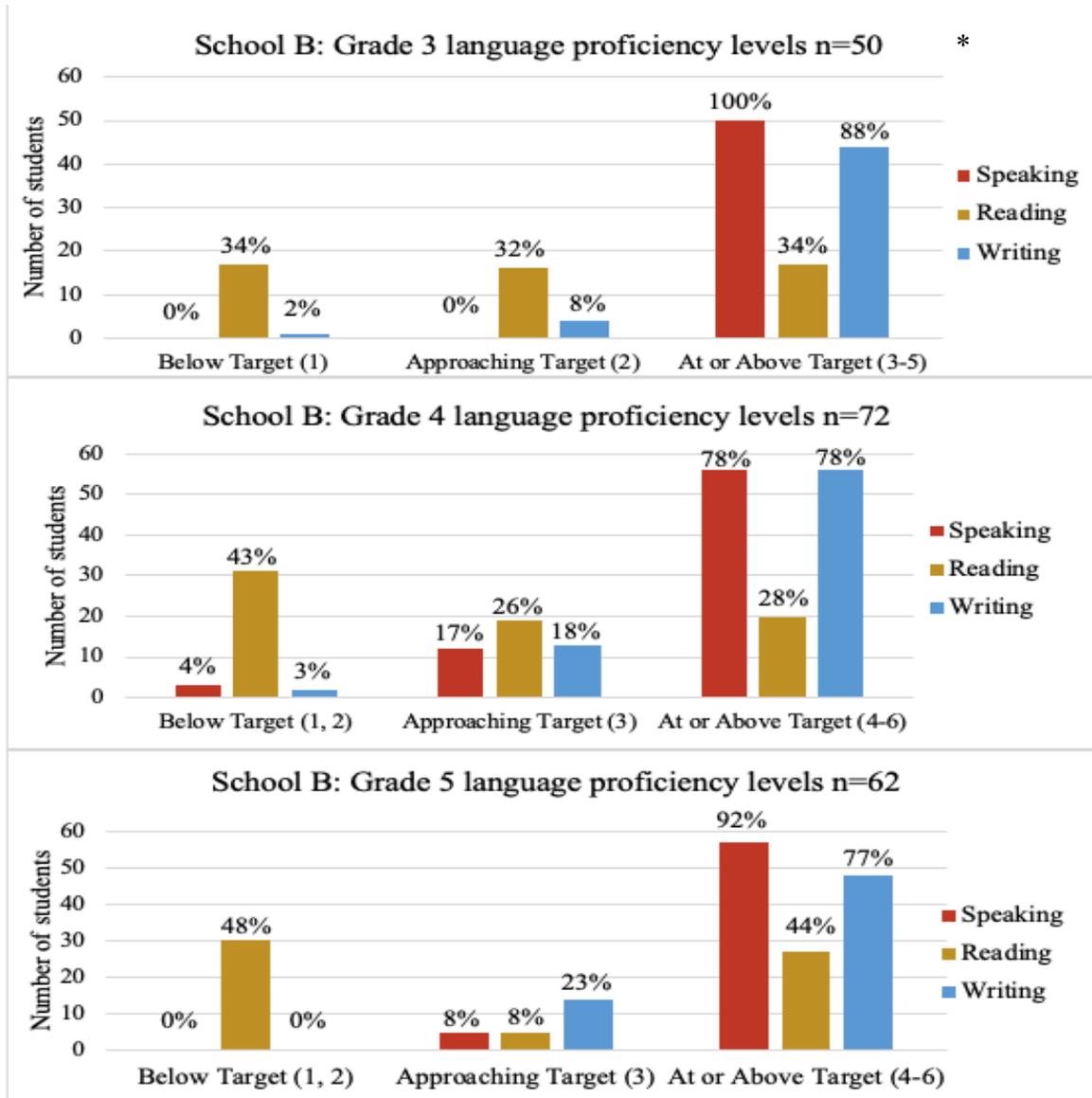
Note. In the 4th grade chart, no scores were recorded for <u>one</u> of the 72 test takers based on the raw data provided by School B.

According to figure 16, different grades had different numbers of test takers. However, the much lower number of 50 in third grade raised the question of how and why. In response to the request for clarification, the data manager at School B responded as follows:

The numbers are correct, we did have fewer 3rd grade students take the

STAMP4se than PARCC. A few of the students participated in our Zhulin

program (it is now discontinued). Students that struggled in English and Chinese

were pulled out of Chinese immersion and did a traditional 1 hour a day of

Chinese Language Learning. They were called the Zhulin (J. Olin, personal

communication, June 29, 2022).

It is important to note that School B provided support to struggling students to minimize the possibility of achievement gaps.

As shown in Figure 16, each language skill was represented in different colors. In the top chart of the third grade, 100% of the fifty students met the speaking proficiency target of Novice High. Only 34% met the novice-high benchmark for reading, while 34% were below target and 32% approach. There were about 88% who met the writing benchmark of Novice High.

As shown in Figure 16, speaking is the strongest of the three language skills. For speaking, grade level benchmarks were met by 78% of fourth-, 92% of fifth-graders, and 100% of third-graders. The second strong one was the writing skill ranging from 77% to 88% who achieved proficiency. A weaker reading skill was visible across all three grades, with 34% of third graders meeting benchmarks, 28% in fourth grade (Intermediate Low), and 44% in fifth grade (Intermediate Low). So, more than 50% across the three grades did not meet the reading proficiency benchmark.

The target proficiency benchmark for fifth grade was in the Intermediate Low. Figure 17 illustrates students' performance across the three language skills by grade five.

Figure 17

School B: Students met CLA proficiency target in speaking, reading, and writing (grade 5)

School B: Students met CLA grade-level proficiency target (Grade 3 to 5)
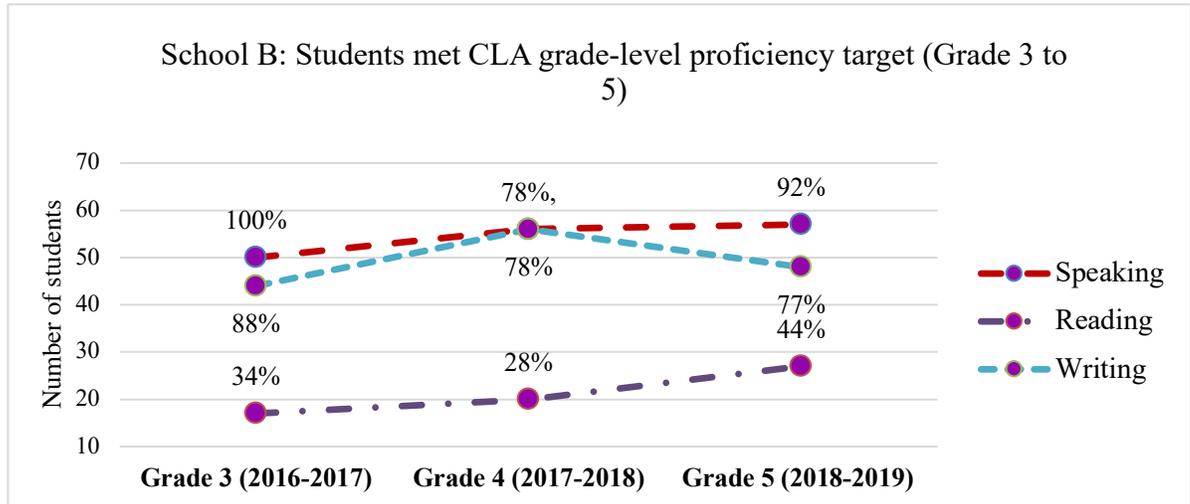
About 92% of students had achieved Intermediate Low or higher in speaking, 77% in writing, and 44% in reading measured by STAMP assessments (Figure 16).

According to the Avant Assessment's scoring rubric of the characteristic of Intermediate Low, it suggested the student who achieves this proficiency level can understand the main ideas and explicit details in both written and spoken materials related to daily life and familiar topics, demonstrate the ability to produce simple sentences with enhanced use of adverbs and prepositional phrases, and start to show the capability in using vocabulary beyond the most frequent used words with errors but do not interfere understanding of the communication (Avant Assessment (n.d.)

Discussion

Although biliteracy is one of the primary goals of language immersion education, the extent to which the immersion programs are on track in achieving the biliteracy goal is often overlooked or overshadowed by the attention on English proficiency. The data presented in this summary is consistent with the past research findings that language

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immersion learners perform as well as or better than non-immersion learners in the core subject of ELA. However, the proficiency of the non-English target language received less attention from education stakeholders.

In the teacher survey of these two schools, the shared similarities have been identified in teachers' educational background, teaching experience, CLA literacy materials, literacy instruction, and access to support staff. Due to literacy instruction being considered a key component of biliteracy development, the statistical analysis was conducted to verify that there were no significant differences between the two groups regarding the strategies used in the classroom.

Moreover, both schools shared a diverse student population based on their demographic profiles shown in Figure 17.

Figure 17

An overview of student demographic characteristics of School A and School B

School A: Students' demographics

8%, Multi-Racial
5%, Hispanic
16%, Asian
16%, African American
46%, Male
54%, Caucasian
54%, Female

■ Male ■ Female ■ Caucasian ■ African American ■ Asian ■ Hispanic ■ Multi-Racial

School B: Students' demographics

16%, Multi-Racial
8%, Hispanic
16%, Asian
37%, African American
51%, Male
22%, Caucasian
49%, Female

■ Male ■ Female ■ Caucasian ■ African American ■ Asian ■ Hispanic ■ Multi-Racial

It is encouraging to see a diverse representation of ethnicities in both schools. As emphasized by the American Academy of Arts and Sciences (2017), the ultimate goal of improving language learning should focus on better language education access for all students regardless of ethnicity and socioeconomic status. The two schools shared a similar ratio of female and male students, with a slightly higher percentage of females in School A. There was a 32% higher Caucasian population in School A (54% School A versus 22% School B) and 21% lower African American students than the students in school B (16% School A versus 37% School B).

Some differences were two language allocations in core subjects and protected instruction time in Chinese language arts. In School A, math and science were taught in Chinese exclusively. Social studies were conducted in English and the specials/enrichment classes (arts, music, library media, SEL, P.E). In contrast, in School B, all the subjects except the special classes were instructed in both Chinese and English. Regarding instruction time designated for CLA, the survey results indicated about 20-49 minutes per day in School A and 110-139 minutes in School B. The question remains whether these differences contributed to or hindered the biliteracy development. Hope the two visuals shown in Figure 18 can provide some answers.

Figure 18 illustrates how the two schools performed in ELA and CLA by presenting two charts side by side.

Figure 18

Students' performance in CLA and ELA by grade five in School A and School B

School A: CLA (n=36)/ELA (n=33) 5th grade

ELA 88%
CLA Writing 14%
CLA Reading 19%
CLA Speaking 69%

School B: CLA (n=62)/ELA (n=62) 5th grade

ELA 69%
CLA Reading 44%
CLA Writing 77%
CLA Speaking 92%
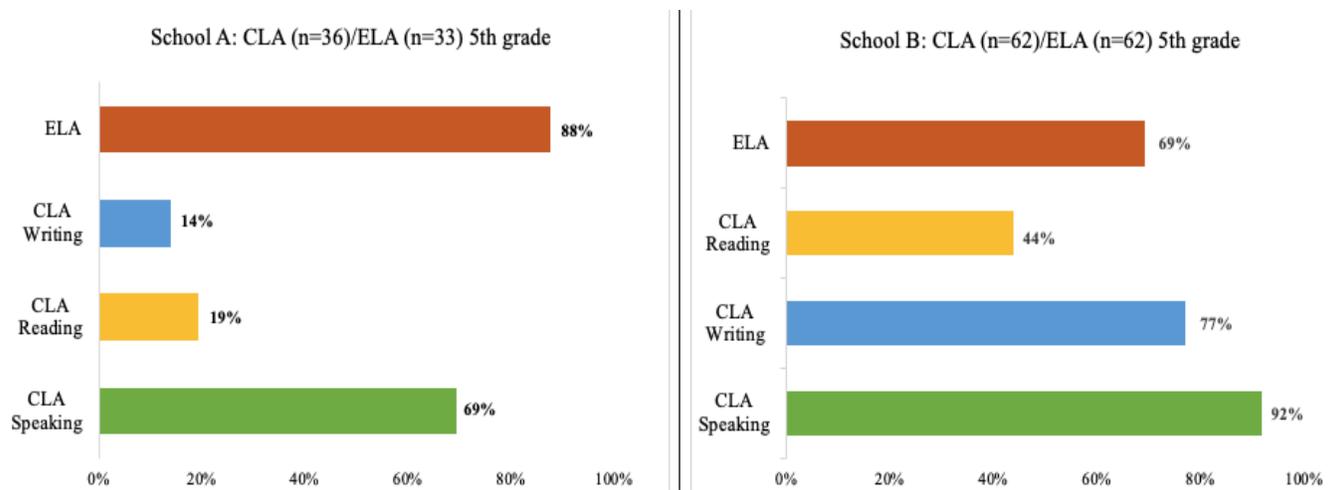
On the left side of Figure 18, the chart displays the percentage of the students in School A who met the grade-level targets in ELA and CLA in speaking, reading, and writing. The right side represents the ratio of the students in School B. Evidently, students in School B perform relatively well in all sections, varying from 44%-to 92%; the students in School A ranged from 14% to 88% in the four areas.

School A had 88% of students reach grade level in ELA, while School B had 69%.

Speaking appeared to be the most potent Chinese language skill based on data from both schools.

Immersion students outperformed their non-immersion peers in the ELA assessment, providing tangible and extended evidence of the benefits of language immersion, which teaches students a new language and strengthens their understanding of their native language.

Regarding Chinese language proficiency, there were different development trends in these two schools, although the two schools shared a similar program model 50/50.

In short, the difference in the two language instruction allocations and the protected instruction time for CLA appeared to have played a role in distinguishing students' learning outcomes, particularly in Chinese language development. The core subjects taught in both languages could have cultivated a safer and more reciprocal environment to facilitate cross-language transfer in biliteracy development. Growing research confirmed the positive effect of cross-language learning between two languages, regardless of whether the language is the native or second language. When one language is more developed, the greater potential is for transfer into another language. Therefore, when students are instructed in two languages, and both languages are supported and promoted in the classroom, students are more likely to develop higher language proficiency (Melby-Lervag & Lervag, 2011).

The protected instruction time committed to the Chinese language in School B could have optimized the Chinese language literacy learning trajectories. The Defense Language Institute of the U.S Department of Defense estimated that it would take about 64 weeks for Chinese learners to reach a similar proficiency level as those students studying alphabetic languages (e.g., French, Italian, Spanish), which takes about 26 weeks (Association of the United States Army, 2010). The estimated learning time of the Chinese language further assures the necessity and importance of securing sufficient instruction time for learners to succeed in developing Chinese literacy.

The Pearson r test was used to quantify the relationship between 'instruction time' and 'test scores' to prove the hypothesis that students' test scores are closely related to instruction time invested in Chinese.

Because fourth graders in both schools have higher numbers, and the statistical analysis was based on the fourth-grade data (33-third grade, 37-fourth grade, and 36 -fifth grade in School A, and 50, 71 and 62, respectively in School B). In this Pearson test, the reading data was selected since it appeared to be the weaker of the three (speaking, reading, and writing). Table 9 shows the results of the Pearson r test.

Table 9

Pearson r results

Correlations School A & B

		Time for Chinese 4th grade	Numeric score 4th-grade reading
Numeric score 4th grade reading	Pearson Correlation (r):	1	.538**
	Sig. (2-tailed)		.000
	N	108	108

** Correlation is moderate between 0.5 and 0.7.
N=108 (School A: n=37 plus School B: n=71)

The mean instruction time in School A was 32.14 (20-49min. per day), and the mean reading score was 1.49. The mean instruction time of School B was 127.13 (110-139 min. daily), and the mean reading score was 2.77. Pearson r (108) =0.54 (Table 9).

Based on the coefficient ranges below, the instruction time and test scores are moderately correlated because 0.54 is between 0.5 and 0.7. Correlation coefficients whose magnitude is between 0.5 and 0.7 indicate variables that can be considered moderately correlated (Introduction of statistics n.d.).

The coefficient ranges from -1.0 to +1.0,

- -1.0 is a strong inverse relationship
- 0 indicates no relationship
- +1.0 is a strong direct relationship

To verify whether the correlation is statistically significant, one-way ANOVA (Analysis of Variance) was conducted (Table 10). Since these two schools offer different instruction times for CLA, the ANOVA test is to clarify whether there is any difference in the test scores of the two groups of students. The hypotheses are as follows,

H0: There is no difference between the two groups

H1: There is a significant difference between the two groups

Table 10

ANOVA results for speaking and reading

ANOVA

		Sum of Squares	df	Mean Square	F	Sig.*
SPEAKING SCORE	Between Groups	.151	1	.151	.205	.652
	Within Groups	78.099	106	.737		
	Total	78.250	107			
READING SCORE	Between Groups	40.362	1	40.362	29.377	.000
	Within Groups	145.638	106	1.374		
	Total	186.000	107			

* Correlation significant at $p < .001$

Df indicates the degree of freedom. F shows the ratio of mean squares (between groups)/ mean squares (within groups); the more significant the F-value, the greater the evidence of a difference between the two groups. The f-value in this ANOVA table is 29.377, indicating a difference between the two groups.

The analysis revealed a statistical significance (p.< 0.000) of the correlation between the two variables in developing reading proficiency. More instruction time committed could increase the reading scores. On the other hand, the P value for the speaking scores was 0.652 (0.652>0.5), which indicated no statistical correlation between the two groups (Table 10).

To strengthen the findings, another one-way ANOVA was carried out for writing proficiency (Table 11). The writing assessment was only offered to the fifth grader in School A. So, the writing data was gathered from the fifth grade of both schools. The purpose of this test is the same as the test for speaking and reading above. The hypotheses are as follows,

H0: There is no difference between the two groups writing scores

H1: There is a significant difference between the two groups writing scores

Table 11

AVOVA results for writing

Writing of 5th grade   Descriptive

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	Upper Bound
1	35	3.26	1.197	.202	2.85	3.67
2	62	4.13	.778	.099	3.93	4.33
Total	97	3.81	1.034	.105	3.61	4.02

ANOVA

Writing Score

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	17.006	1	17.006	18.862	.000
Within Groups	85.653	95	.902		
Total	102.660	96			

Note. F-value greater than 1(F-18.862) and the $p<.001$.

Df indicates the degree of freedom. F shows the ratio of mean squares (between groups)/ mean squares (within groups); the more significant the F-value, the greater the evidence of a difference between the two groups. The f-value in this ANOVA table is 18.862, and *P<.001 indicates* a significant difference between the two groups.

As shown in the descriptive (Table 11), School A was coded as 1(n=35) and School B as 2 (n=62). The mean writing score of the fifth grade from School A was 3.26, and the mean score of the fifth grade from School B was 4.13.

ANOVA test on writing (Table 11) further supported the hypothesis that instruction time correlated significantly with learning outcomes. ANOVA results show F-value greater than 1 (F-18.86) and the $P<.001$ indicating there is a significant difference between the two groups. Based on the above statistical results, I hope they can provide insight into how to strengthen CLA literacy skills and consider increasing instruction time for CLA literacy.

Limitations

The findings shed some light on issues in biliteracy development; however, several limitations should not be overlooked. First, the smaller sample size could make it challenging to generalize the findings. The two schools used different tests in ELA and CLA, although the developers of the assessments claimed the tests were CCSS-aligned. Third, both schools are part of the public school system; nevertheless, School B is a charter school with greater flexibility over curriculum, academics, and other matters usually decided by the district.

Conclusion

The results of the two schools revealed that Chinese immersion programs provided a unique opportunity for students to develop proficiency and literacy in Chinese and English. However, the data also showed that even a similar program model of 50/50 could lead to different learning outcomes in biliteracy development due to the various program contexts, such as a strand within a traditional school versus a whole-

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school model, core subjects taught in one or both languages, and the sufficient instruction time in Chinese literacy development.

Although the results distinguished School B students in more positive biliteracy trajectories, the Chinese literacy goal was only partially realized. English continues to be privileged in both academic and social contexts of language immersion schools; regardless of the immersion program models (Babino & Stewart 2016), the goals of bilingualism and biliteracy continue to be challenging to achieve. The indisputable realities are urging school stakeholders to be conscientious of target language literacy development to achieve the program goal of biliteracy.

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Appendix F

ARTIFACT 6: SUMMARY OF TEACHER SURVEY

Introduction

The survey was intended to obtain contextual information about the two Chinese immersion programs (CI) in schools A and B from teachers working in these programs. Information gathered was teachers' education background and teaching experience, instruction time for both Chinese language arts (CLA) and English language arts (ELA), the Chinese and English languages allocation in teaching various school subjects, CLA curriculum materials, literacy instructional strategies, and the inclusion of support staff at each school.

The survey contained twenty-two questions, nineteen of which were closed questions, and three were open-ended to allow for comments about the strengths of the CI programs and opportunities to share improvement suggestions. The questions were grouped into two sections: teacher demographics and literacy curriculum and instruction. Some of the questions are as follows,

Teachers' demographic information

1. Are you a Chinese or English teacher?

2. What is the highest level of education you have completed?

3. How long have you been working as a teacher?

4. What grade are you currently teaching?

Curriculum and instruction

1. How often do you co-plan with your partner teacher?

2. What supporting staff do you work with in the Chinese immersion program?

3. How are the two languages (Chinese and English) used in the instruction to teach school subjects at the grade level you teach?

4. How many minutes per day are scheduled for teaching CAL or ELA at the grade level you teach?

5. What curriculum materials do you use to teach Chinese Language Arts?

6. Using 1-5 scale to indicate the degree to which you agree with the nine instructional statements listed?

The objective of the survey was to gather data to examine the similarities and differences in the curriculum and instructional approaches of the two CI programs. Students' achievement data were also collected to be analyzed to explore if the differences in curriculum and instruction influenced students' trajectory of biliteracy development.

Procedure

The survey was designed using Qualtrics Survey Software, which collected all the responses. I did not distribute the survey link via the anticipated participants' email to keep the survey participants anonymous. Instead, the contact person at each school distributed it via their internal school email system. The survey was open for ten days.

Summary of the Survey Results

There were thirty-two participants, about 64% of the anticipated fifty teachers of both schools. Seventeen of the thirty-two are from the district[23] of School A, and fifteen

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[23] As School A is a strand model, a very small number of staff is immersion teacher. So, the survey sent out to the Kindergarten and another strand model elementary immersion program teachers in the district.

are from School B. About 69% of the participants are Chinese teachers, including one

school administrator in School B, and the rest, 31% the immersion program English

teachers. The survey completion rate was 71% (32 respondents), who answered 100% of

the twenty-two questions. The remaining 29% (nine respondents) answered 60% to 91%

of the survey questions. One of the reasons could be that some of the questions being

indicated for Chinese teachers suggested that the English teacher may skip or vice versa.

In Figure 1, the bar chart illustrates the distribution of the participants' educational

backgrounds by school. There were seventeen participants from School A and fifteen

from School B.

Figure 1

An overview of teachers' education level at Schools A & B
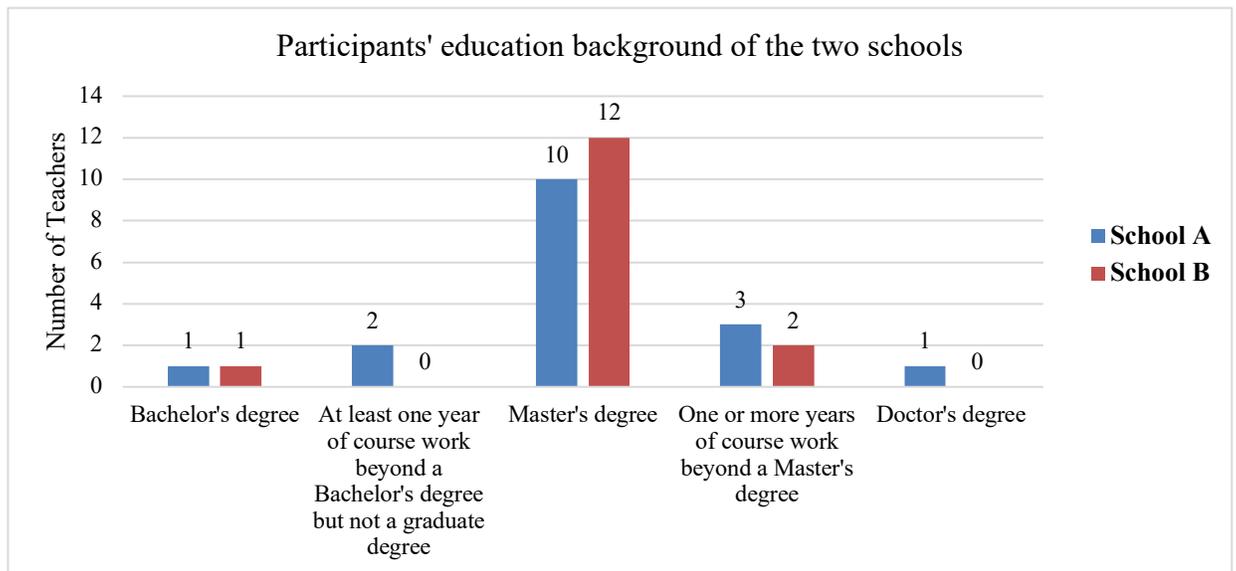
Two schools had an equal number of teachers with master's degrees or higher:

fourteen in School A, including one with a doctorate, and fourteen in School B.

Regarding teaching experience, Figure 2 show an overall of the percentage of

each category.

Figure 2

Teaching experience of the participants from Schools A & B
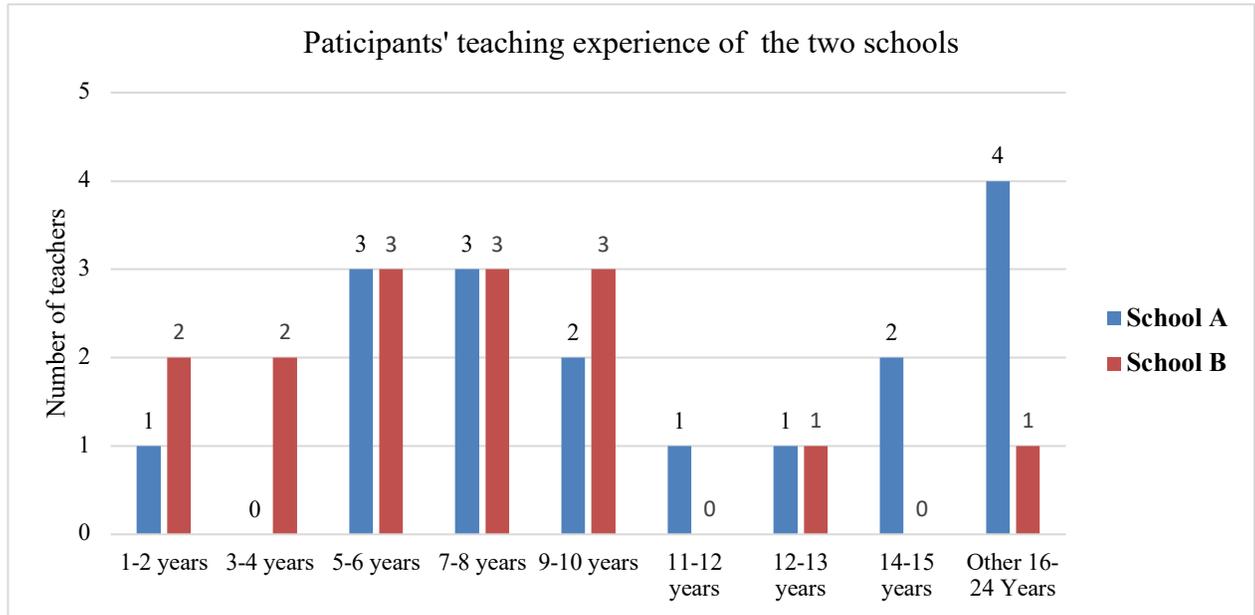
Sixteen participants (94%) from School A indicated teaching more than five years range from five to twenty-four. Only one participant has less than five years. Results from School B, eleven of the fifteen (about 73%) of the survey participants indicated their teaching experience from five to seventeen years, while four have less than five years.

The average teaching years (mean in Tables 1 and 2) are broken down by Chinese and English teachers at each school (A and B).

Table 1

School A- the average years of teaching experience among Chinese and English teachers

Q4. How long have you been working as a teacher?

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Chinese teacher	2.00	15.00	8.10	3.42	11.69	10
2	English teacher	10.00	24.00	16.71	4.33	18.78	7

The average teaching year of Chinese and English teachers is shown in Table 2 for

School B.

Table 2

School B-the average teaching experience among Chinese and English teachers

Q4. How long have you been working as a teacher?

#	Field	Minimum	Maximum	Mean	Std Deviation	Variance	Count
1	Chinese teacher	2.00	17.00	7.42	3.97	15.74	12
2	English teacher	4.00	13.00	8.33	3.68	13.56	3

In responding to question 6, 'what grade are you currently teaching?', seventeen

participants from School A indicated a range from Kindergarten to fifth grade (Table 3).

Every one of the five grades has at least one representation. No pre-k grades are included

in School A enrollment system.

Table 3

School A- counts of participants' teaching grade

Kindergarten	2
1st grade	3
2nd grade	4
3rd grade	2
4th grade	4
5th grade	2
other	0
Pre-k (3 years old)	0
Pre-k (4 years old)	0
Total	17

Fifteen participants from School B reported their teaching grades from pre-k, 3 and 4 years old, Kindergarten, first, second, but zero for fourth and fifth grades (Table 4).

Table 4

School B- Counts of participants' teaching grade

Kindergarten	2
1st grade	2
2nd grade	4
3rd grade	2
4th grade	0
5th grade	0
other	3
Pre-k (3 years old)	1
Pre-k (4 years old)	1
Total	15

Q7. How often do you co-plan with your partner teacher?

The responses from School A, 'once per week,' was identified by about 30% of the participants, while 'daily' was the least, which received only one count. Three of the four (about 18% who selected 'other' provided some specifics, as displayed in Table 5. It appeared not to be directly related to co-planning.

Figure 1

School A- report on the frequency of co-planning with partner teachers

Q7 - How often do you co-planning with your partner teacher?

Count	
■ Once per week	5
■ Twice per week	4
■ other	4
■ Monthly	3
■ Daily	1
■ Every other week	0
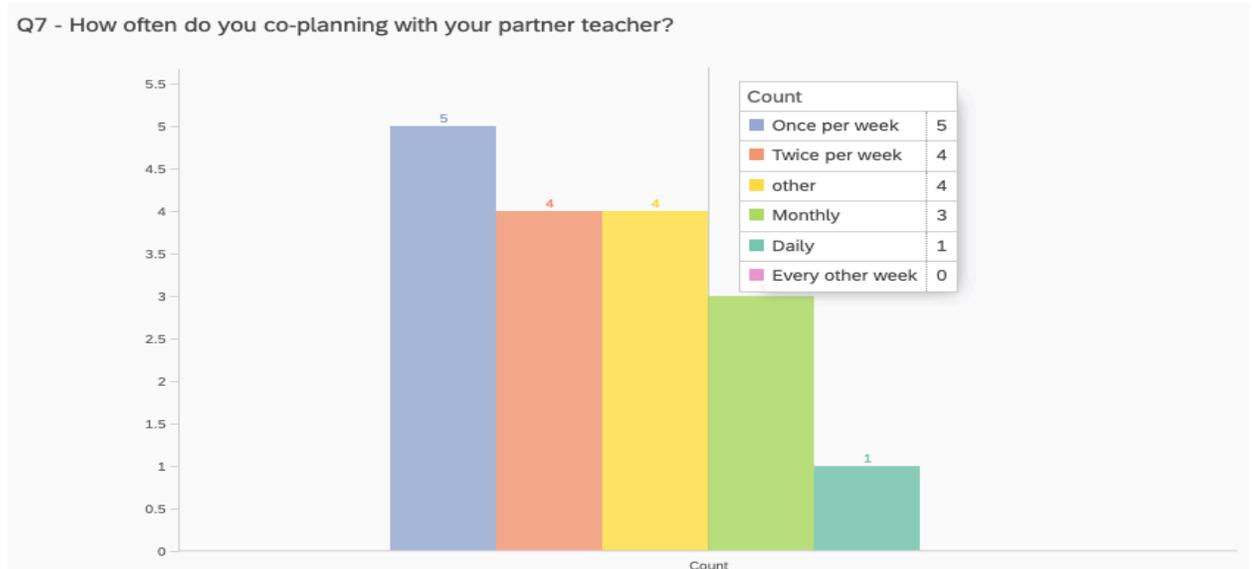
Table 5

School A- explanation in 'other' section

other

only to discuss events- My chinese partner is back in China so we have a sub.

Base on need, we did some culture, holiday theme activities.

We touch base daily about student issues such as behavior or other general management issues, but not often about academic planning.

School B reported the results on the frequency of co-planning (see Figure 6). About 53% (eight of fifteen) reported 'twice per week', and 20% (three participants) stated 'daily'.

Figure 6

School B- frequency of co-planning with partner teachers

Q7 - How often do you co-planning with your partner teacher?

Count	
Twice per week	8
Daily	3
Monthly	2
Once per week	1
other	1
Every other week	0
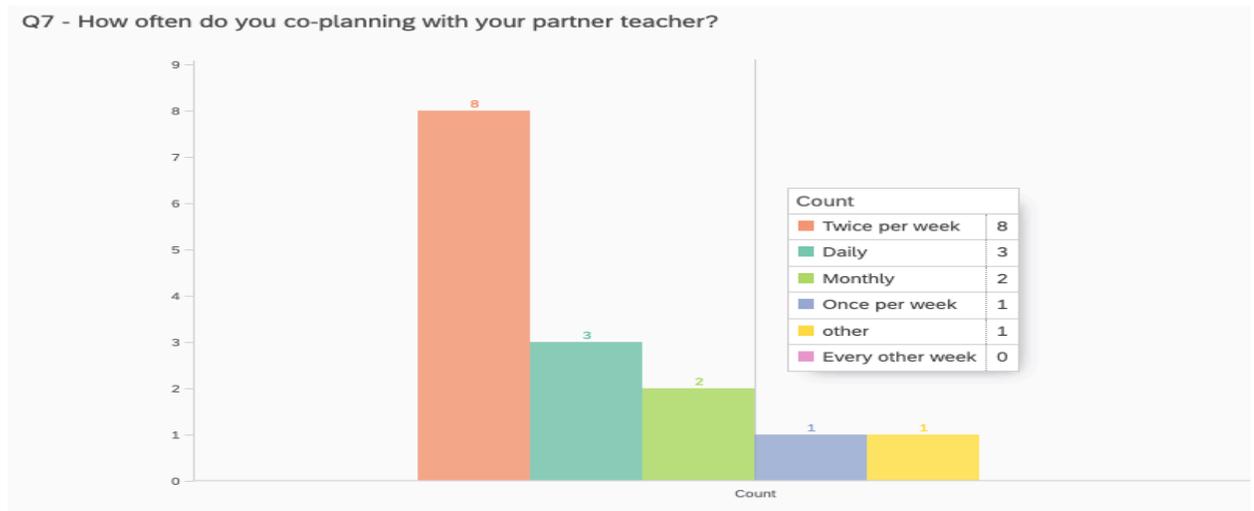
The results of both schools show that co-planning with partner teachers in School B is more frequent than in School A.

Q9. What supporting staff do you work with in the Chinese immersion program?

Responses collected from School A indicated about 31% of participants have worked with interventionists and about 54% from School B (Figure 7).

Figure 7

Overview of different supporting staff attribution in School A and School B

School A-what supporting staff do you work with?

School B-what supporting staff do you work with?
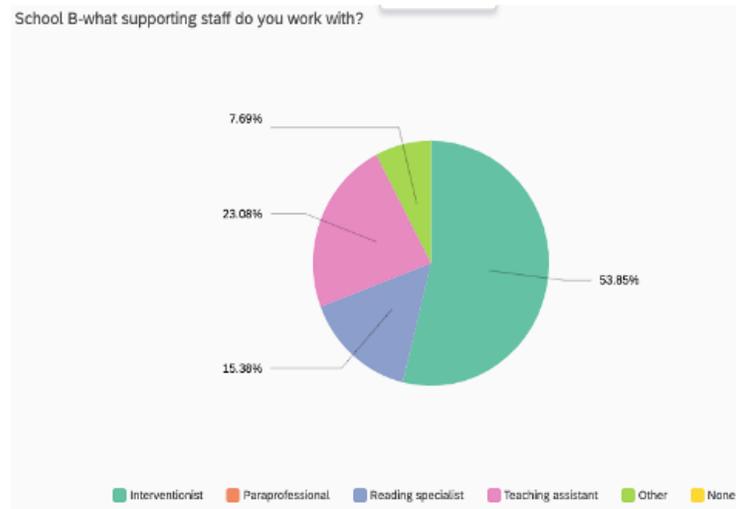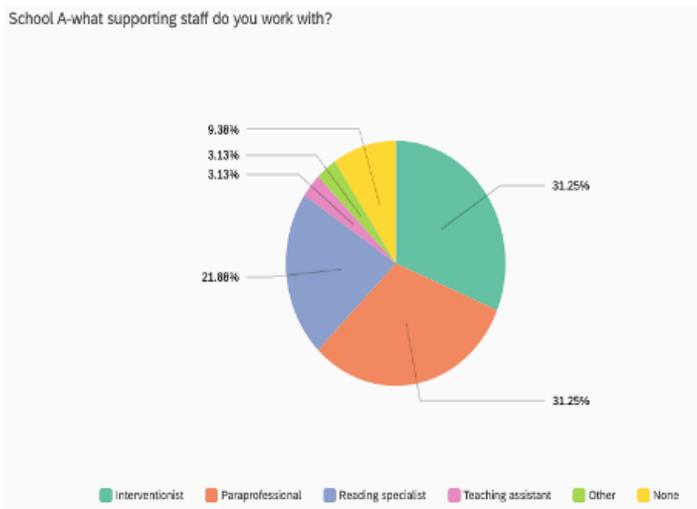
In School A, three participants (about 18%) reported 'none'. Among Chinese teachers, six of ten (60%) reported working with interventionists. One Chinese teacher indicated that she worked with other Chinese teachers who were not regarded as supporting staff in this case.

About 31% of participants from School A had access to interventionists, while about 54% from School B. The data can be interpreted as the administrators at both schools providing necessary support, including reading specialists and special education staff mentioned in 'other' to meet the needs of the diverse Chinese immersion learners. It is worth noting that supporting staff shown in Figure 7 are available for Chinese immersion teachers at both schools, although the supporting staff might not be bilingual, speaking in Chinese and English.

The following three questions are the crucial part of this survey that explores the instructional model adopted at each school. In response to 'how are the two languages (Chinese and English) used in the instruction to teach school subjects at the grade level you teach?', the results from School A shown in Table 6. The consensus was reached on

English as the instructional language for arts, music, social studies, and physical education (P.E.). However, in terms of math and science, about 59% of the participants indicated the instruction language is Chinese, while about 41% responded in both languages, Chinese and English.

Table 6

School A- responses about the two-language allocation in teaching school subjects

Q10. How are the two languages used in teaching school subjects?

#	Field	Chinese		English		Both Chinese and English		Total
1	Math	58.82%	10	0.00%	0	41.18%	7	17
2	Science	58.82%	10	0.00%	0	41.18%	7	17
3	Social Studies	7.14%	1	92.86%	13	0.00%	0	14
4	Arts	0.00%	0	100.00%	14	0.00%	0	14
5	Music	0.00%	0	100.00%	14	0.00%	0	14
6	Physical Education	0.00%	0	100.00%	14	0.00%	0	14

Showing rows 1 - 6 of 6

The discrepancy in the responses between the instructional language of Chinese and both language of Chinese and English for math and science could have been due to the description of the instruction model adopted in School A. As shown in Figure 8, on the right side of the chart shown subjects are taught in English, about 10% of the instruction time is designated for "Content transfer" which is also known as "Bridge lessons". Some respondents might have interpreted this component as part of the official instructional language for math and science, so they checked 'both languages.' Per the School A instruction model (Figure 8), these two subjects are designed to be taught in Chinese for half of the school day. Still, about 10 or 15% of the instruction time in English was designated for students' content transfer or bridge lessons for math and science.

Figure 8

School A: Immersion Instruction model (k-5)
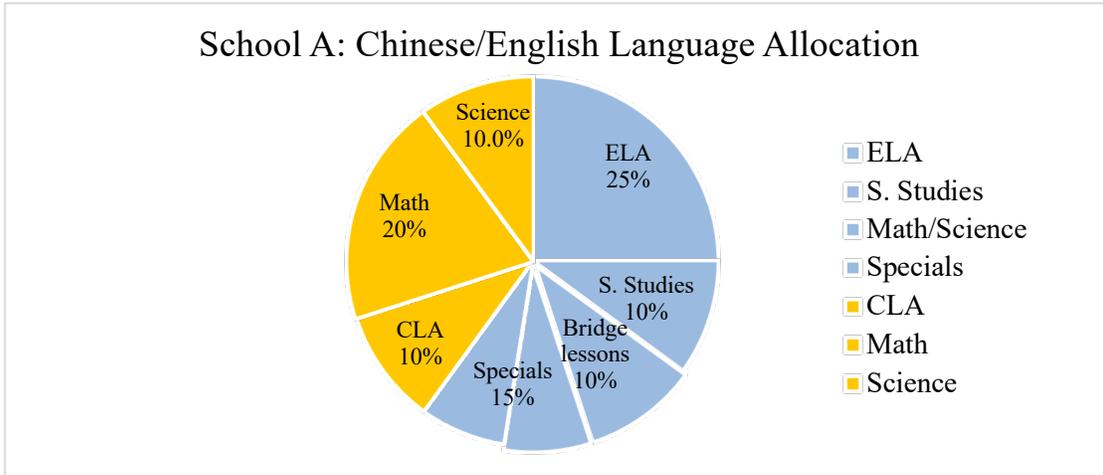
In reference to the time scheduled to teach CLA, about 92% of responses across the grade level from School A selected '20-49 minutes' (Figure 9). Only one participant checked for 59-79 minutes. The responses are aligned with the instruction model at School A (Figure 8).

Figure 9

School A-responses on time scheduled to teach Chinese language arts at each grade

Q11. How many minutes per day are scheduled to teach Chinese language arts at the grade level you teach?
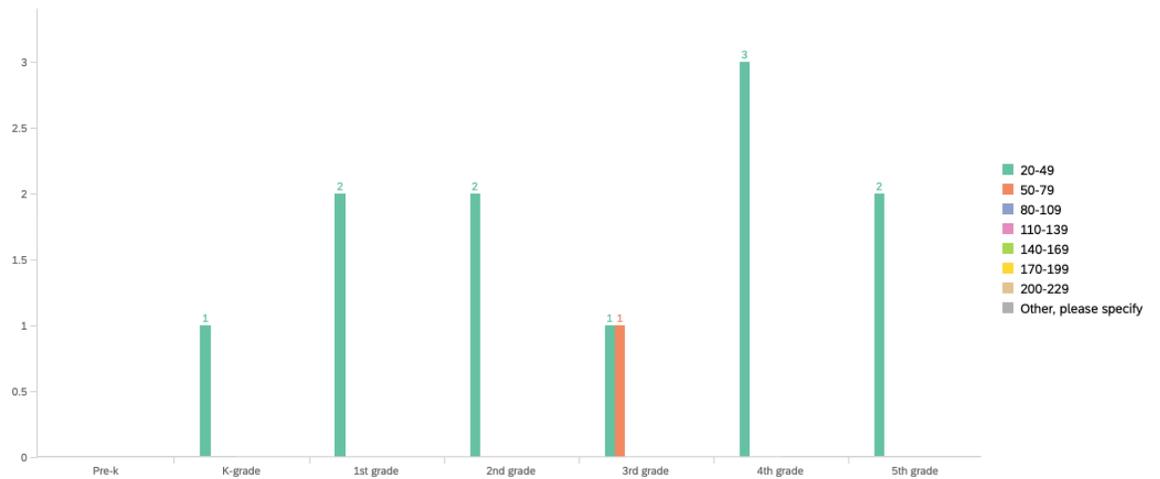
However, the responses to the time scheduled to teach ELA in School A are scattered, as shown in Figure 10, ranging from 50-79, 110-139 and 140-169 minutes. Per the instruction model in Figure 8, about half of the instructional day (150 minutes) is designated for teaching ELA, including 10% for social studies and 10% for content transfer or academic language development.

Figure 10

School A- responses on time-scheduled to teach English language arts

Q12. How many minutes per day are scheduled to teach English language arts at the grade level you teach?
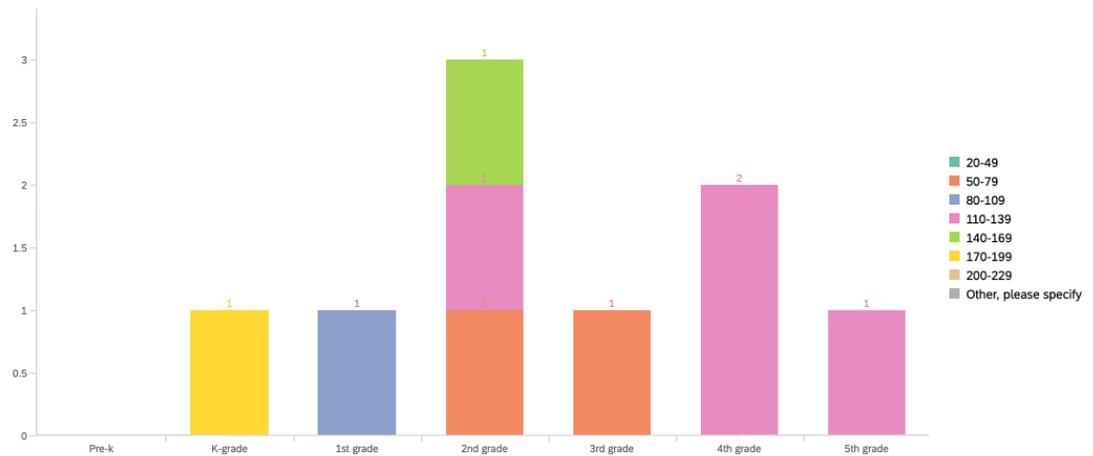
As shown in Figure 8, the essential arts classes of arts, library media, music, Social Emotional Learning (SEL) and P.E were not included in the chart. Otherwise, these subjects take up to at least 45 minutes daily, and each class is generally offered once per week. In other words, the actual instruction time for CLA and ELA is less than shown in Figure 8. Therefore, the responses with 110-139 minutes might reflect the closest to the actual instruction time for ELA (Figure 10).

I noticed problems with the responses from School B while analyzing the data collected on questions 10, 11, and 12 about the two-language allocation and the

instruction time for CLA and ELA. Q11. How many minutes per day are scheduled for teaching Chinese language arts at the grade level you teach? (English teachers may skip to Q12). Each participant should have selected a one-time slot for the grade level that the participant teaches. For example, the two pre-k teachers from the fifteen participants should have only chosen one of the time slots scheduled for CLA. For some reason, each of the two pre-k teachers selected multiple (seven) time slots, and some of the time choices were selected more than once, as shown in Figure 11.

Figure 11

School B-sample responses on time scheduled to teach CLA
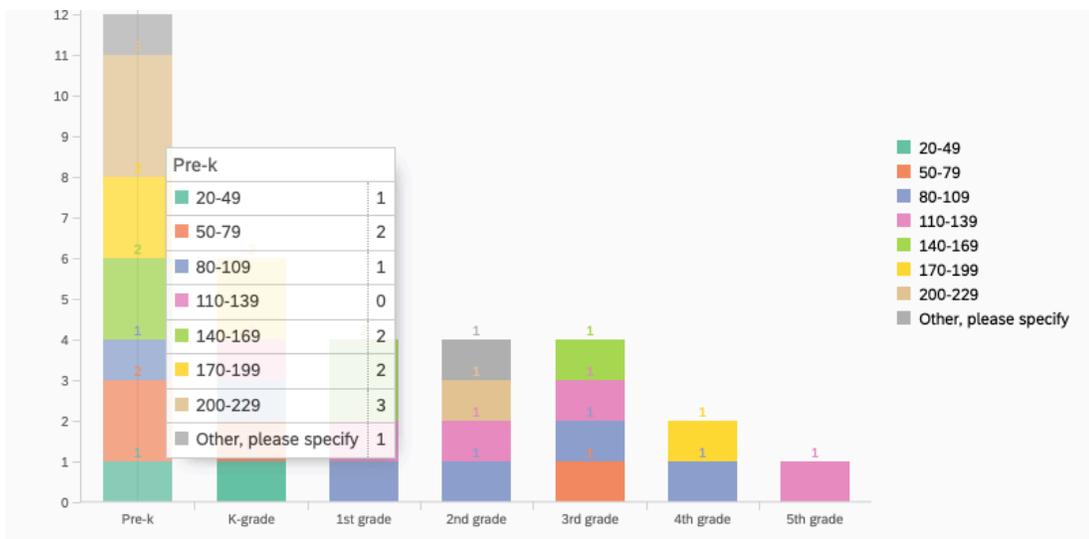
These scattered responses appear to confuse readers without knowing the curriculum background of School B. School B is one of the International Baccalaureate (IB) World schools that adopted the IB curriculum framework. School B serves students ages 3 to 12 and implemented IB Primary Years Program (PYP), designed for pre-Kindergarten to fifth-grade learners.

The curriculum framework of PYP explains, "It offers a transdisciplinary, inquiry-based and student-centered education with responsible action at its core, enabling students to learn between, across, and beyond traditional subject boundaries (International Baccalaureate Organization, n.d.).

The PYP curriculum encourages students to learn beyond traditional subject boundaries, which could have led to different responses from participants on questions 11 and 12. Teachers might not teach exclusively Chinese or English language arts but are embedded with other school subjects.

For clarification, I contacted the Chinese immersion coordinator, the designated contact person in School B for this research project. She shared with me that the school has shifted to a different instruction model that started in September of the current school year, 2021-2022, and the instruction time for CLA for each grade has changed. The data I intend to collect is the year from 2017 to 2019 before the pandemic took place. No particular years were identified for the survey participants. Some of the data might have reflected the new instruction model instead. According to the Chinese curriculum coordinator in School B, the teaching schedule for the school year 2017-2019 should be as follows (Table 7).

Table 7

Clarification by the curriculum coordinator in School B

Q10- How are the two languages (Chinese/English) used in the instruction to teach school subject at the grade level you teach?

School B	2017 –2019 Chinese Immersion Instruction Model				
Grade	Math 1.Chinese 2.Both 3.English	Science 1.Chinese 2.Both 3.English	Social Studies 1.Chinese 2.Both 3.English	Specials [1] 1.Chinese 2.Both 3.English	Two-language switch
Pre-k 3 years	1	1	1	3	n/a
Pre-k 4 years	1	1	1	3	n/a
K-grade	2.Both	2.Both	2.Both	3	Daily [2]
1st grade	2.Both	2.Both	2.Both	3	Daily
2nd grade	2.Both	2.Both	2.Both	3	Daily
3rd grade	2.Both	2.Both	2.Both	3	Daily
4th grade	2.Both	2.Both	2.Both	3	Daily
5th grade	2.Both	2.Both	2.Both	3	Daily

Q11-How many minutes per day are scheduled for teaching Chinese language arts at the grade level you teach?

Grade	20-49	50-79	80-109	110-139	140-169	170-199	200-229	Notes
Pre-k 3 years	All subject contents were taught in Chinese language with CLA oracy-focused							k-5 40% of the school day for CLA (45-60 min for CLA readers' workshop & 45-60 min for CLA writers' workshop).
Pre-k 4 years	All subject contents were taught in Chinese language with CLA oracy-focused							
K-grade			√					
1st grade			√					
2nd grade			√					
3rd grade			√					
4th grade			√					
5th grade			√					

[1] Specials include Arts, Library media, Music, PE & SEL (Social Emotional Learning)
[2] Half Day on Fridays, two languages alternate every two weeks

Note: Adapted from the tables by the curriculum coordinator in School B.

For the question 'are grades for Chinese and English language arts both listed in the report card?', the responses from both schools concluded that in School A, only English language arts grades are reported on the students' report cards. By contrast, in School B, both grades of CLA and ELA were included in the students' report cards.

Concerning curriculum materials for CLA, no similarities in the material selection were identified between the two schools. In School A, "Better Chinese" was elected for lower grades from Kindergarten to third grade, while "Mandarin matrix' was for fourth and fifth grades. In School B, four of the ten participants selected "Level Chinese' while six of the ten selected 'other', but no specific details were provided. So, I reached out to the Chinese curriculum coordinator again to clarify, and I was told most of the curriculum materials were created by the grade level Chinese instruction team according

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to the IB curriculum map (Exhibit A). Still, a few upper-grade teachers also use "Level

Chinese" as supplement materials. As a result, the CLA curriculum materials in School B

are decided by the immersion instruction team, while in School A, it was selected by the

State Department of Education (DDOE).

Even though the two programs' Chinese literacy curriculum materials were

decided by different sources of personnel, there appeared to be little difference in the

mid-range of satisfaction levels between the two groups (Figure 12). There were four

options on the Likert scale to measure satisfaction: 'Strongly agree', 'Somewhat agree',

'Somewhat disagree' and 'Strongly disagree'. Figure12 below shows how School A and

B responded to the effectiveness in developing literacy.

Figure 12

School A and B response to the CLA materials' effectiveness in developing literacy
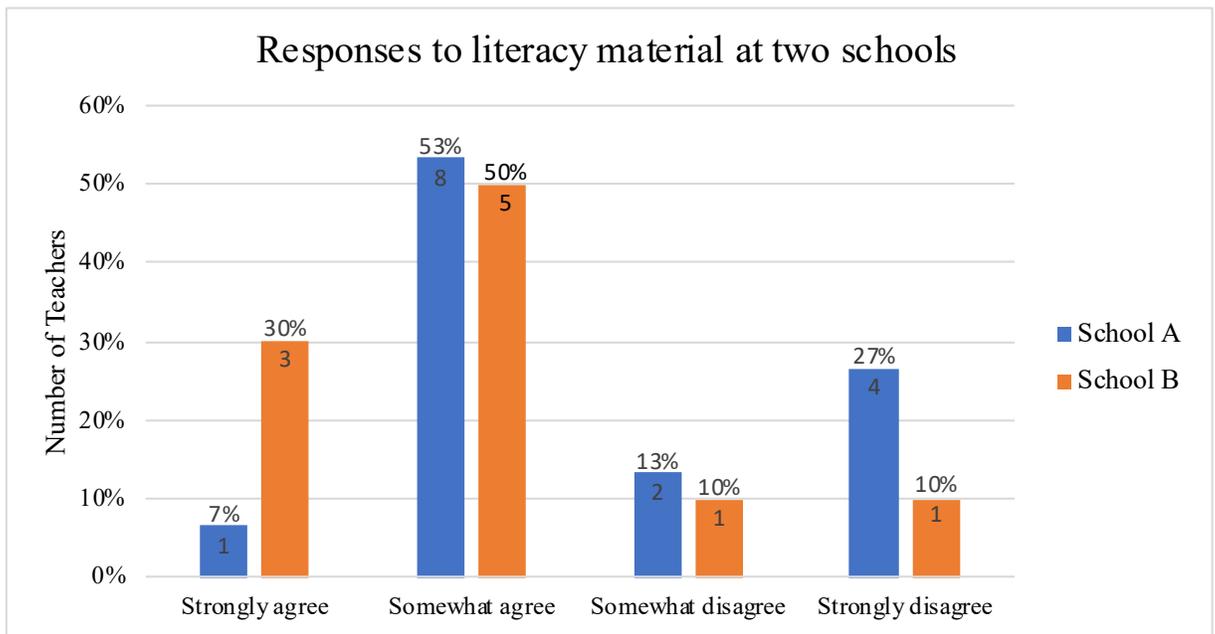
According to the response 'somewhat agree', there wasn't much difference between 53% from School A and 50% from School B. However, there was a large difference (7% vs 30%) between the 'strongly agree' and 'strongly disagree' between the two schools. The strongly agree number from School B was higher at 30%, while School A showed only 7%. Consequently, School B's 'strongly disagree' rating was just 10%, far lower than School A's (27%). The seemingly large differences between 'strongly agree' and 'strongly disagree' could lead audience to believe one literacy material was more effective than the other without a statistic test. Literacy materials are regarded as one of the key factors for literacy development.

Therefore, a T-test was conducted to determine whether the satisfaction levels of the two groups were statistically different. Since T-test only works with numeric data, a numeric value has to be assigned to each of the four Likert scale response: Strongly agree=4, Somewhat agree=3, Somewhat disagree=2, and strongly disagree=1.

Table 8

T-test results on response about Chinese literacy materials

Group Statistics

	GROUP	N	Mean	Std. Deviation	Std. Error Mean
SCORE	1	15	2.40	.986	.254
	2	10	3.00	.943	.298

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
SCORE	Equal variances assumed	1.251	.275	-1.517	23	.143**	-.600	.396
	Equal variances not assumed			-1.531	20.050	.141	-.600	.392

Note. ** No significant difference between the two groups as *p*>.05.
The abbreviation 'N' stands for the number of participants, and 'Mean' represents the average score.

As shown in Table 8, School A (n=15) was coded as 1, and School B as 2 (n=10). The number of the participants reflected the Chinese teachers only as English teachers were not required to answer it. The mean for School A was 2.4 and for School B was 3. While there appeared to be a large difference between the two groups in terms of 'strongly agree' and 'strongly disagree', results in Table 8 indicate "no significant difference' was tested ($P=.143$) as the $P>.05$.

For survey question 17, the participants were asked to indicate on a 1-5 scale about the nine statements related to instructional practice in the CLA classroom. The nine instructional practices are as follows:

1. Provide context clues to students to help them understand the material;
2. Connect with students' real-life experiences;
3. Reading Chinese text aloud to help with recognition;[24]
4. Have students read aloud for fluency of pronunciation;
5. Reading aloud improves students' reading fluency;
6. Teach students to identify Chinese characters based on their radicals;
7. Pinyin, tones, and radicals are practiced in class;
8. Use characters to make sentences or phrases to demonstrate students' understanding
9. Use the teaching materials to prompt students to act out what they've read.

The survey results indicate some variations in teachers' responses to the listed strategies used between Schools A and B. 'Provide context clues to students to help them understand the material' received the highest average number among the two schools, the

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[24] Chinese is the only logographic writing system still in use. Radical is the base component of each character. Pinyin is the phonetic system in Chinese, a linguistic tool used to type Chinese characters in the Latin alphabet. This aids both with reading Chinese and its pronunciation.

mean of School A is 4.9 of 10 and 4.78 of 9 in School B. In reference to the different 'read aloud' strategies of numbers 3, 4, and 5 'Reading Chinese text aloud to help with recognition'; 'Have students read aloud for fluency of pronunciation'; and 'Reading aloud improves students' reading fluency'; School A responses indicated higher mean numbers than School B.

The survey results reflected a slight variation between Chinese teachers from Schools A and B in their use of nine instructional strategies. Concerning those instruction strategies play an important role that directly influences literacy learning outcomes, an ANOVA test (Table 9) was performed to test whether there were any significant differences between the two groups when it comes to literacy instruction practices. The survey question did not ask English teachers to respond since it addressed Chinese literacy instruction strategies. There were ten participating Chinese teachers from School A, coded as '1' as shown in descriptive in Table 9, and nine from School B coded as '2'. The mean scores on the responding scale of 1-5 were 4.29 from School A and 3.96 from School B.

Table 9

ANOVA results

Descriptive

Mean

	N	Mean	Std. Deviation	Std. Error
1	10	4.29	.679	.215
2	9	3.96	1.05	.349
Total	19	4.13	.864	.198

ANOVA

Mean

	Sum of Squares	df	Mean Square	F	Sig. *
Between Groups	.503	1	.503	.661	.427
*Within Groups	12.943	17	.761		
Total	13.446	18			

* No significant difference among the two groups at $p > .05$

Df indicates the degree of freedom. F shows the ratio of mean squares (between groups)/ mean squares (within groups); If the F value is less than 1 and the *p-value* is greater than .05, there is no difference between the two groups. The F-value in this ANOVA table is .661, and the *p-value is greater than .05.*

The ANOVA test results (Table 11) indicated no significant difference between the two groups from School A and School B since the F-value was smaller than 1, and the P-value was greater than .05.

Regarding training on CLA literacy instruction (Q.18 for Chinese teachers and Q.19 for English teachers), the results show a similar pattern of responses from both schools: about 94% of both schools indicated they did receive the training on literacy instruction in a variety of formats, ranging from PD sessions, webinars, teacher guides, and ongoing professional learning community (PLC). PD session was recognized as the

most used delivery method, but PLC was the least. Only one participant of each school indicated they received 'none'. In the response about the training on English literacy instruction, the results from both schools repeated a similar pattern for Chinese literacy instruction. However, all three English teachers from School B unanimously responded 'none' to this survey question.

For the three open-ended questions of Q20, 21, and 22, 100% of the participants of School A answered Q20, while eight (53%) participants were from School B. About 76% of participants from School A responded to Q21 and about 46% from School B. The last open-ended question 22, asking participants to provide suggestions, received lower responses; 53% (nine of seventeen) from School A and 47% from School B.

Data from School A to Q20 (what are the strengths of the Chinese immersion program at your school?) can be categorized into the following areas,

- Administrators' support - "the district and school are very supportive" and "support from the administrator and partner teachers."
- Strong partner-teacher collaboration and teamwork - "all of the Chinese and ELA teachers work together collaboratively" and "support each other"
- Excellent academic achievement with additional language skills - "students' achieved higher goals in ELA and math than regular classroom students" "students are exposed to a new language and culture" 'developing problem-solving skills by learning Chinese," and "immersion model is best for acquiring languages."

The responses from School B to Q20 were more focused on the following two areas,

- Strong curriculum and inquiry-based learning - "my school has developed strong curriculum and resources" and "students learn language through inquiries."

- A total immersion in early grades - "full immersion in pre-k-3 and PreK-4 seems to be a huge asset for language acquisition" "students start in PreK-3, a good young age."

In responding to Q21 (what are the strengths of the instruction design of the Chinese immersion program at your school?), School A emphasized the bridge lessons in English for math and science "administration has built in time for the English side to bridge math lesson" "partner teacher can help with math instruction (bridge lesson) to reinforce the math concepts daily." School B emphasized the benefits of the instruction model in early grades "the 75/25 model recently implemented in Kindergarten and grade 1 seem to be a strength for continued Chinese immersion, as students transition out of full immersion in pre-k," "we teach language and IB unit together, "and "we aligned Chinese and English literacy curriculum."

For Q22 - What suggestions do you have for how your school can improve the Chinese immersion program?

The suggestions proposed by School A were as follows,

- More instruction time for Chinese language arts

- Curriculum materials for Chinese language arts chosen by DDOE need to be revised and evaluated and develop Chinese literacy mapping and guidelines

- Chinese-speaking supporting staff, paraprofessional, interventionist, and reading specialist

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- Built-in time for Chinese teacher collaboration

The suggestions proposed by School B were as follows,

- More training on Chinese literacy instruction and language teaching skills

- Provide more support in the classroom, develop a robust Chinese language support team to support students at all levels and one Chinese fellow plus one English fellow

- Vertical Chinese literacy guidelines

Conclusion

Overall, there are significant similarities between the two schools in terms of the teachers' biographic information, collaboration with partners teachers, literacy instruction strategies, and training on literacy instruction, including access to supporting staff at each school. Furthermore, the proposed suggestions from both schools mirror each other on additional training in Chinese literacy instruction, Chinese-speaking supporting staff, and vertical curriculum mapping on Chinese literacy development.

Some differences are primarily represented in curriculum framework, instruction design of two languages in teaching school subjects (Table 10), and protected instruction time for CLA (Table 11).

In addition, School A is not part of IB world schools like School B, which focuses on inquiry-based learning. School A serves first through fifth grades, while School B serves pre-Kindergarten through fifth grades. As shown in Table 10, the two-language allocation in teaching school subjects is quite different.

Table 10

Two language allocation in teaching school subjects between School A and School B

School A	2017 -2019 Chinese Immersion Instruction Model				
Grade level	Math 1.Chinese 2.Both 3.English	Science 1.Chinese 2.Both 3.English	Social Studies 1.Chinese 2.Both 3.English	Specials [1] 1.Chinese 2.Both 3.English	Two-language switch
K-grade	1	1	3	3	Mid-day
1st grade	1	1	3	3	Mid-day
2nd grade	1	1	3	3	Mid-day
3rd grade	1	1	3	3	Mid-day
4th grade	1	1	3	3	Mid-day
5th grade	1	1	3	3	Mid-day

School B	2017 -2019 Chinese Immersion Instruction Model				
Grade level	Math 1.Chinese 2.Both 3.English	Science 1.Chinese 2.Both 3.English	Social Studies 1.Chinese 2.Both 3.English	Specials [1] 1.Chinese 2.Both 3.English	Two-language switch
Pre-k 3	1	1	1	3	n/a
Pre-k 4	1	1	1	3	n/a
K-grade	2.Both	2.Both	2.Both	3	Daily [2]
1st grade	2.Both	2.Both	2.Both	3	Daily
2nd grade	2.Both	2.Both	2.Both	3	Daily
3rd grade	2.Both	2.Both	2.Both	3	Daily
4th grade	2.Both	2.Both	2.Both	3	Daily
5th grade	2.Both	2.Both	2.Both	3	Daily

Note. [1] Specials include arts, music, library media, Social Emotional Learning (SEL) & PE.

[2] Half day on Fridays, and two languages alternate every two weeks.

As shown in Table 10, all the special classes were taught in English at both schools. In School A, math and science were primarily taught in Chinese. Some responses checked both languages because there was about 10% time scheduled in English for math or science, which also referred as 'bridge lessons' or 'content transfer'. Nevertheless, the 10% bridge lessons were not intended to teach curriculum content but rather academic terminology in English for these two subjects as the state mandate

accountability assessments were in English only. The two languages switched in the middle of a school day for School A (Table 10). If in the morning, math and science was taught in Chinese, then this group students would switch to English in the afternoon for ELA including 10% for math and science bridge lessons.

As shown in Table 10, in School B, a total immersion of 100% Chinese was implemented in pre-k grades of three and four years old. From Kindergarten through fifth grade, academic subjects of math, science and social studies were taught in both languages and the two languages switch daily. However, Table 10 did not show how the two languages were allocated in teaching different subjects. Figure 13 contains two pie charts that illustrate the details of how the two-language used in different school days.

Figure 13

Two sample school days of the wo language used in teaching academic subjects in School B
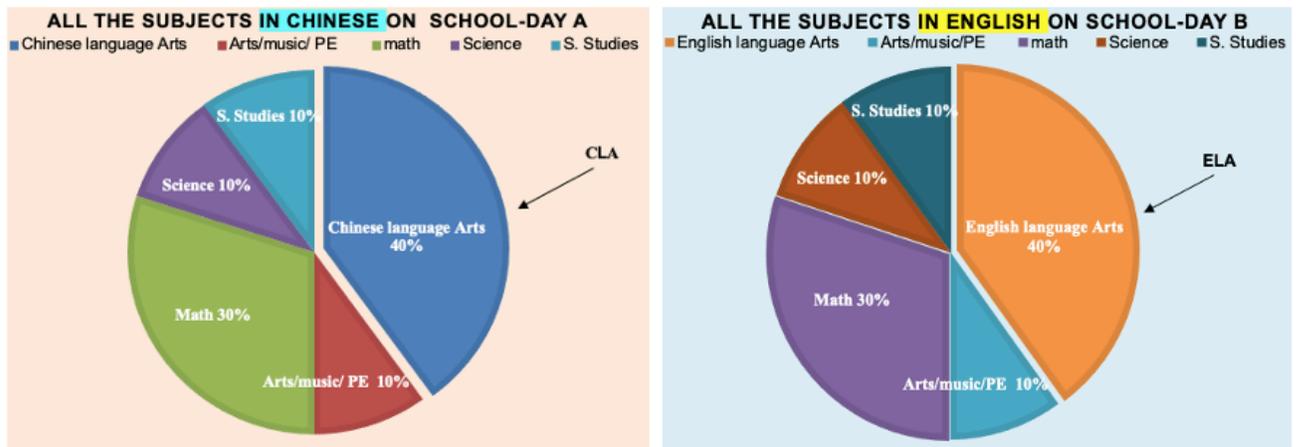
The left pie chart in Figure 13 illustrated the different percentage in Chinese for different subjects on A Day, then, the following day would be a B Day, the language switched to English. The pie chart on the right illustrated the distribution for English language used in the core subjects. It is important to note Chinese and English language arts both received

about equal 40% of instruction time on alternate school day respectively. In general, a school day consists of 300 minutes of instruction. 40% equal about 120 minutes (Table 11). School B's instruction model enables equal protected instruction time for CLA and ELA (Figure 11) since the design nurtures balanced instruction of both languages. On the other hand, the School A model limits its CLA instruction time to 20-49 minutes per day (Table 11).

Table 11

An overview of the instruction time scheduled to teach CLA between School A and School

B

School A-Instruction time scheduled to teaching Chinese language arts per day

Grade Level	20-49	50-79	80-109	110-139	140-169	170-199	200-229	Notes
K-grade	√							CLA, math & science are scheduled in half of a school day
1st grade	√							
2nd grade	√							
3rd grade	√							
4th grade	√							
5th grade	√							

School B- Instruction time scheduled to teaching Chinese language arts per day

Grade	20-49	50-79	80-109	110-139	140-169	170-199	200-229	Notes
Pre-k 3 years	All subject contents were taught in Chinese language with CLA oracy-focused							No CLA 'readers' or 'writers' workshop
Pre-k 4 years								
K-grade	All subject contents were taught in Chinese and English on alternate days with CLA oracy-focused							Same as above
1st grade				√				It is about 40% of the school day for CLA (45-60 min for CLA readers' workshop and 45-60 min for CLA writers' workshop).
2nd grade				√				
3rd grade				√				
4th grade				√				
5th grade				√				

One ELP objective is to explore whether these different program contexts contribute to biliteracy development, which was analyzed and discussed in the summary of the biliteracy data of these two schools (Appendix E).

References:

International Baccalaureate Organization. (n.d.). *Curriculum framework.* Retrieved May

29, 2022, from https://www.ibo.org/programmes/primary-years-

programme/curriculum/

Exhibit A

Washington Yu Ying Program of Inquiry

	Who We Are (WWA) 我们是谁	Where We Are in Place and Time (WWAIPAT) 我们身处在什么空间和时间	How We Express Ourselves (HWEO) 我们如何表达自己	How the World Works (HTWW) 世界是如何运作的	How We Organize Ourselves (HWOO) 我们如何组织自己	Sharing the Planet (STP) 共享地球
	An inquiry into the nature of the self; beliefs and values; personal, physical, mental, social and spiritual health; human relationships including families, friends, communities and cultures; rights and responsibilities; what it means to be human.	An inquiry into orientation in place and time; personal histories; homes and journeys; the discoveries, explorations and migrations of humankind; the relationships between and the interconnectedness of individuals and civilizations from local and global perspectives.	An inquiry into the ways in which we discover and express ideas, feelings, nature, culture, beliefs and values; the ways in which we reflect on, extend and enjoy our creativity; our appreciation of the aesthetic.	An inquiry into the natural world and its laws; the interaction between the natural world (physical and biological) and human societies; how humans use their understanding of scientific principles; the impact of scientific and technological advances on society and on the environment.	An inquiry into the interconnectedness of human-made systems and communities; the structure and function of organizations; societal decision-making; economic activities and their impact on humankind and the environment.	An inquiry into rights and responsibilities in the struggle to share finite resources with other people and with other living things; communities and the relationships within and between them; access to equal opportunities; peace and conflict resolution.
PreK 3	Individuals come together to form a community. 个人聚集在一起组成社区.		People use different forms of the arts to respond to their environment by expressing their ideas and feelings. 人们根据环境通过不同的艺术形式来表达思想与情感.		Food can go through a process before we consume it. 在食物被食用之前, 它们会经过一个过程.	Many different kinds of living things inhabit the Earth. 地球上生活着许多不同种类有生命的生物.
PreK 4	Identity develops through awareness of ourselves and others. 自我意识和对他人的了解帮助我们发展身份认同.		Social play is an avenue for improvisation and collaboration. 社交游戏是即兴和协作的途径.	Humans can observe, compare, classify and change the physical world. 人类可以观察、比较、分类和改变物质世界.		Bugs and people affect each other across different environments. 虫子和人类在不同环境中互相影响.
Kinder	Choices affect the way relationships form and grow. 人们的选择决定了人际关系的形成.	Exploration and failure inspire innovation over time. 探究和失败驱使革新.	Storytellers can discover new worlds and show us our own. 故事帮助我们探索新世界也展示自我认识.			Habitats are shaped by geography and living things. 地域和生物影响栖息地的状态.
Grade 1	Understanding our emotions helps us to manage ourselves. 了解情绪帮助我们自我管理.	Understanding the impact of ancient civilizations helps us understand the present. 了解古代文明能帮助我们了解现代.	People design for function and communication of ideas. 人们用设计来获取动能和表达想法.	Forces are essential for motion. 运动需要力.	People live, work and interact within their communities. 人们在社区里生活、工作和互动.	Over time, living things adapt to survive. 生物为了生存而适应环境.
Grade 2	The choices we make affect our health and well being. 身体系统影响人类健康.	Organized representations communicate information. 空间的呈现传达信息.	Dramatic arts express thoughts, feelings and information. 表演艺术表达想法、感觉和信息.	Investigating matter helps us understand the world. 我们通过探索物质来认识世界.	Global markets change to meet the needs and wants of consumers. 产品的改变符合顾客的需求.	Systems use and share resources, which can impact others. 系统中存在资源的运用和分享.

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Appendix G

ARTIFACT 7: PROPOSED INSTRUCTION DESIGN

Introduction

In addressing the documented deficiencies in Chinese literacy of the DE Chinese immersion program, I used a case study method to analyze two Chinese one-way 50/50 immersion programs that implemented different instruction models. Drawing on the research findings in the immersion field, the most critical step in the success of language immersion is the selection of the immersion instruction model. One of the essential factors for success is the way in which instruction the two languages is appropriately allocated to support each language for biliteracy development (Fortune, 2008; Tabors & Snow, 2001). In addition, research on effective language immersion education has suggested that best practices and theory-based instruction models are essential to successful learning outcomes (Genesee et al., 2006; Montecel & Cortez, 2002).

Thus, this case study focused on the instruction design of the two Chinese immersion programs to investigate whether students' Chinese literacy learning outcomes differ despite the two programs sharing the same one-way immersion model. Comprehensive program profiles for each campus were established, and students' achievement data for two programs were analyzed. The hypotheses that the program instruction design influenced Chinese literacy development have been supported.

In light of the differences in the Chinese writing system, I outlined the recommended instruction design for improving Chinese literacy skills. The proposed instruction model embodies the synthesis of research findings and the achievement data analysis for the two programs.

Proposed Instruction design

Research-based best practices for immersion alphabetic partner language literacy development were used for the proposed instruction design, as there were few existing studies on specific one-way Chinese literacy. One of the critical factors in language immersion from traditional world language programs is that the partner language functions as a vehicle to access the content. Therefore, it is vital for the learner to achieve the necessary grade-level Chinese proficiency to continue their studies in secondary schools. Drawing from the statistical analysis of the biliteracy data of the two schools, the proposed instruction design reflects the changes in the following areas:

- Early oral language development to enhance literacy proficiency

- Committed instruction time to improve Chinese literacy proficiency

- Academic subjects in both languages to enhance cross-language transfer

- The whole school model versus a strand model within a school

The following discussion is divided into four areas and includes research-based instructional recommendations.

80/20 Proposal for Chinese Oracy Development

Although the importance of early literacy was not elaborated on in the biliteracy achievement data analysis (Appendix E), existing research demonstrates the overwhelming influence of early literacy in immersion programs. Participation in early bilingual education positively shapes students' academic achievement (Roscigno et al., 2001). The research on second language acquisition suggests that language development

is not linear, but much more rapid at the beginning, and then slowing as proficiency increases (Howard et al., 2018).

In light of the simple fact that native English learners have been exposed to spoken English and started using baby language at home before starting school in pre-K or Kindergarten, they entered the Chinese immersion program without any previous exposure to Chinese. As a result of these realities, it was evident that the starting points of learning the two languages were not linguistically equal. It is approximately four or five years ahead of the Chinese in terms of English development. Hence, in order to attain biliteracy, there should be greater exposure to Chinese as opposed to English in the early grades. The current 50/50 model for K-5 is not the appropriate approach to meet the needs of the learners. Increasing the language exposure time to Chinese in the early grades should be a necessary step to optimize opportunities for literacy development.

A growing body of research suggests that age plays a crucial role in acquiring a second language. The most recent studies of 2/3 million English speakers have shown that it is nearly impossible for learners to reach native-like proficiency without beginning their languages at an early age (Hartshorne et al., 2018). The linguistic research revealed that young children demonstrate implicit early language awareness skills even before they reach school age. The study elucidated young learners of pre-k or K already possess the capacity and ability to benefit in a bilingual learning environment. Even babies as young as 12 months old have shown an understanding of how languages communicate information, regardless of whether they are familiar or unfamiliar (Yamashiro & Vouloumanos, 2018).

Literacy development starts early in school and is highly correlated with school achievement (Reeder et al., 2017). It has been identified in early literacy studies that oral language development is essential for later reading comprehension, as well as phonological awareness in the early years (Spencer et al., (2013). Further, Spencer et al. asserted that supporting young children's language and literacy development has long been considered a practice that results in strong readers and writers later in life. Longitudinal studies suggest that children's language abilities at a given time determine their future reading success. The more limited a child's experiences with language and literacy, the more likely they will have difficulty learning to read.

Early literacy investment is critical, and invested time in oral language development yields high-level literacy skills (National Literacy Institute (NLI), 2009). Given the empirically supported theories behind bilingual education, the recommended instruction model for early grades is an 80/20 split. From grades one through five, the percentage of each language is shown in Table 1. A nearly total immersion model begins in Kindergarten and first grades, where instruction in Chinese is designed 80% and 20% in English (Table 1).

Table 1

*Proposed two language allocations for School A*

Grades	*k-1st*	*2nd*	*3rd*	*4th*	*5th*
Chinese	80%	65%	50%	50%	50%
English	20%	35%	50%	50%	50%

From grade two onward (Figure 1), Chinese instruction gradually decreases to 50%, and English instruction increases until third grade, when Chinese instruction and English instruction are equally divided.

Figure 1

Proposed two language allocations

Proposed time allocation in both languages for k-5
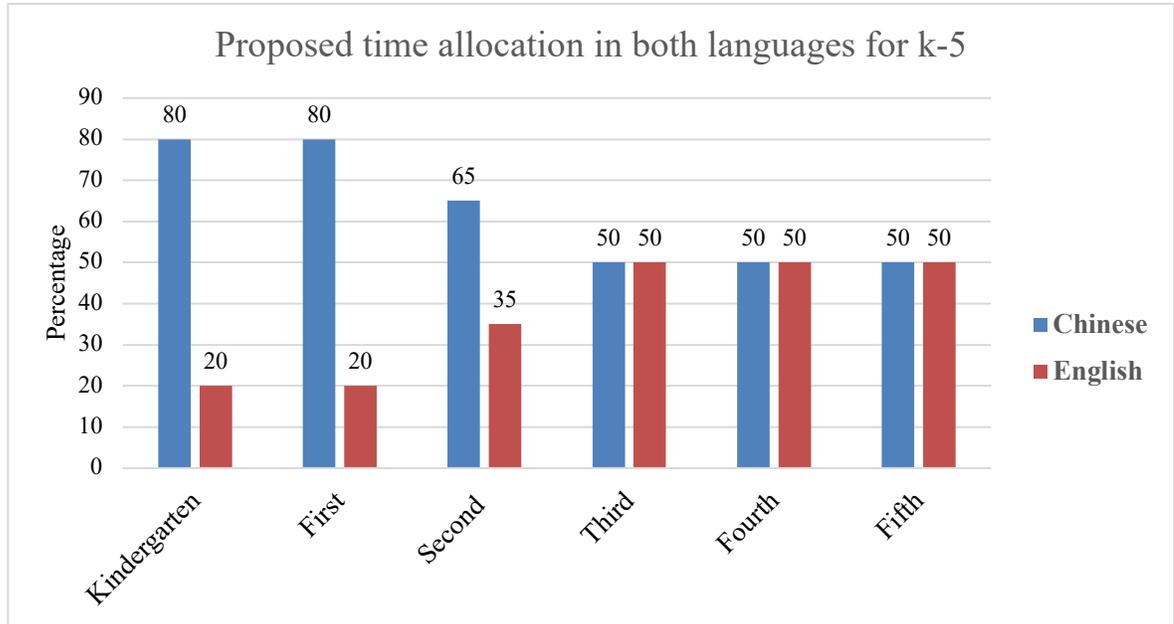
Generally, an authentic total immersion starts with 100% partner language (or at least 90%), as was implemented in School B. Students received 100% in Chinese for all the school subjects during the pre-K (three and four years old) grades.

Along with the proposed instruction model, it is recommended that the two languages switch every other day instead of mid-day, which aims to mitigate the loss of instruction time when language instruction changes in the middle of a school day.

The proposed early-grade immersion model is intended to ensure that students enter-middle school with a strong foundation in Chinese and English. Therefore, the students are prepared with the necessary Chinese literacy skills to be successful in

learning science in Chinese. In addition to one class period designated for Chinese language arts, science was the core subject decided in School A for the middle school immersion. The cohort students in this study are currently in middle school. According to the principal and middle school Chinese teachers, this group of students encountered incredible challenges and difficulties grasping the science content delivered in Chinese. As a result, sometimes, the realities led Chinese teachers to replace Chinese with English which was not supported by the instruction guiding principles for immersion education (Howard et al., 2018).

This early grade model is built on the research recommendation for one-way Chinese immersion programs. Lindholm-Leary & Howard (2008) pointed out that sufficient instruction in Chinese in the early grades plays a vital role in developing students' literacy skills. A one-way immersion program's typical total immersion model was generally recommended and considered beneficial to biliteracy development in later grades.

It is also important to note that early studies conducted in one-way total immersion programs, where English may not be introduced until first or second grades, show a temporary lag in English language skills. However, no long-term adverse effect on English language or literacy development is evident since the lag disappears when instruction in English language arts begins or increases (Fortune, 2012). The analysis results of the PARCC ELA for School B are consistent with this argument, as the average score in the third grade was below the target score, with a total immersion of 100% Chinese for the pre-k years. By fifth grade, the same group of students scored higher than the target (Appendix E).

Based on these findings, the temporary lag in ELA progress could be due to the higher partner language distribution in the early grades. Consequently, this slower progress in ELA deeply troubled some school administrators and parents, leading to some language immersion programs in unmatured eliminations (Lindholm-Leary, 2012). Thus, the 80/20 model was proposed instead of 100% or 90% with the intention of addressing slower ELA progress in the third or fourth grades.

However, increased Chinese instruction in the early grades is only one of several factors that contribute to Chinese literacy proficiency. A common core aligned language arts curriculum should be developed to identify the linguistic structures required to understand the characteristics of the Chinese language for achieving literacy proficiency. According to Li et al. (2002), Chinese reading differs fundamentally from alphabet-based languages, and phonological awareness is necessary to read Chinese. Given the tonal and pictographic structure of the Chinese language, Chinese teachers need to contentiously optimize spoken language opportunities to develop young learners' phonological awareness of the unique speech structure of Chinese to improve reading skills.

Several early literacy studies have shown that oral language development and phonological awareness develop in the early years, establishing the foundation for later reading success (Spencer et al., 2013; Reeder et al., 2017). Notably, non-English partner oral languages positively correlate with reading comprehension, which would be vital to learning the subject matter in language immersion programs (Geva, 2006; Hulme et al., 2019). The ability to read Chinese words is strongly correlated with verbal language skills, which could be essential for early reading skill development. Phonological and morphological awareness skills may also facilitate reading among older children.

Given these pedagogical theories, the young learners' Chinese immersion classroom should reflect the theory-guided best practice to ensure a nurturing language environment for oral language development. It is imperative that literacy instruction training incorporates guidance and knowledge for 'theory into practice.' Tiered literacy instruction by grade level should be purposely developed and implemented to meet the needs of the specific age group.

Committed Instruction Time to Improve Chinese Literacy Proficiency

Even though one-way immersion programs differ widely in structure and implementation, certain features are essential. In designing a language immersion instruction model, a key factor is the language of instruction and the ratio of the use of English to the use of the partner language for instruction (Howard et al., 2018). A key contributor to performance is instruction time, the primary variable between the models and instructional language.

Based on the analysis of CLA assessment data of the two schools in this case study, the protected instruction time plays a crucial role in a one-way Chinese immersion program. The performed statistical ANOVA test indicated instruction time for CLA was significantly correlated with students' learning outcomes. As a result of the data collected from the teacher survey, about 20-49 minutes per day were dedicated to learning Chinese language arts (CLA) in School A and about 110-139 minutes per day in School B (Appendix F).

Due to the different instruction time, the assessment results of the two schools revealed a different trend of CLA trajectories across the three language skills. Statistical analysis of the achievement data demonstrated a correlation between time invested and

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outcomes. It appeared the more time invested; the higher the test scores. Overall, students from School B (110-139 minutes per day for CLA) performed better than students from School A (20-39 minutes).

This finding can be substantiated by the empirical study of language learning timelines summarized by the Foreign Service Institute (FSI) (n.d.). FSI categorizes Chinese as one of the exceptional complex languages for native-English learners. Based on more than 70 years of language teaching experience to U. S. diplomats, FSI estimated it takes about 88 weeks (equivalent to 2200 class hours) to learn Chinese to reach 'Level 3 proficiency'. In contrast, it takes about 24 weeks (600 class hours) to achieve a similar proficiency level for alphabetic languages, such as French, German, Italian, or Spanish (FSI, n.d.). The language guidelines highlight the importance of sufficient time invested in learning Chinese. FSI suggested a learner would need triple the time to learn Chinese compared to learning an alphabetic language to reach a similar level of language proficiency. These data indicate that Chinese instruction should take at least twice as long or longer than alphabetic-based languages.

Moreover, due to the different writing systems between Chinese and English, each of the two languages should be taught independently. Thus, 40% of instruction time for Chinese literacy is proposed (Figure 2), which was increased from the current 15% but not longer than the time in English. More details of the two-language allocation are elaborated on in the next section.

Figure 2

Instruction time proposed for Chinese language arts

- Chinese language arts (CLA)
- Math
- Science
- Social studies (S.S)
- Specials

CLA 40%, Math 30%, Science 10%, S.S 10%, Specials 10%
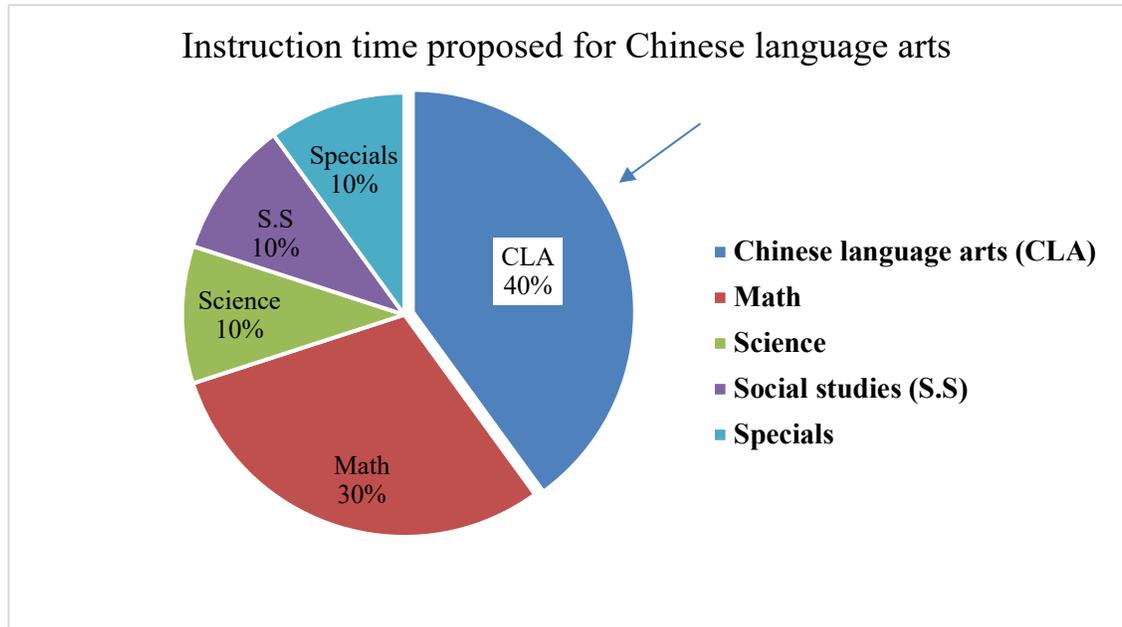
Learning to read and write Chinese takes longer than in other languages, and this is true for both native and non-native Chinese speakers. The complexity and different linguistic system of Chinese requires a much longer time commitment to develop Chinese literacy skills than in alphabetical languages (Met, 2012).

Nevertheless, in reality, most Chinese immersion programs schedule less time for learning Chinese than English, particularly with a strand within a traditional school model, which was the case with School A. As Lü reported in 2019, about 87% (214 programs) of the current Chinese immersion programs across the nation were housed as a strand model, while only 13% (33 programs) were implemented as a whole school model where only language immersion was offered. As pointed out by DC language immersion Project (DC LIP)[25] (n.d.), the strand model creates competition for a school's emotional,

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[25] DC language immersion project is a not-for-profit organization.

financial, and space resources. The inherent internal ranking of different programs within the same building creates both natural and perceived division, adversely affecting school culture (DC LIP, n.d.). In contrast, a whole-school approach promotes a shared vision and goals for the school, strengthening every aspect of the community. In this case study, School B adopted a whole-school model, potentially another factor favoring an equally balanced two-language allocation in teaching core subjects and ultimately leading to a higher biliteracy proficiency.

In addition, as Lo-Phillip (2014) indicated, despite the immersion program objective to produce bilingual, biliterate graduates, English was the dominant language in the U.S. and was the preferred language for general communication in this country. Consequently, a higher value was placed on teaching the English language due to its essential role in U.S. society. Perhaps, the unequal societal value of the two languages might also explain why CLA was scheduled for less instruction time.

Additionally, immersion methodologies were developed on the idea that students would learn language more effectively through meaningful interactions and content instruction. Nevertheless, current research shows that students do not produce high levels of academic proficiency from these approaches alone. As some language education practitioners have discovered, the fluency and grammar ability of most immersion students is not native-like, and there is a need for formal instruction in the partner language (Ballinger, 2013; Lyster, 2007; Swain & Lapkin, 2013). These studies suggest that effective instructional strategies are necessary for learners to become fully proficient in Chinese. For language immersion to be effective, the experts emphasized formal instruction in the partner language as a must and necessity. These findings suggest that

effective instructional strategies and evidence-based practice are crucial for students' higher proficiency in Chinese.

Therefore, increasing instruction time in Chinese alone would not substantially improve students' Chinese literacy proficiency. School administrators must integrate effective literacy strategies and best practices in the scheduled professional development or training for anticipated changes.

Academic Subjects in Both languages to Enhance Across-language Transfer

Kennedy (2019) highlights the importance of a well-designed language allocation plan to achieve biliteracy of immersion program goals. Promoting equity between the two languages and supporting program goals, instruction is systematically assigned in each language and across content areas. Thus, Chinese immersion learners are expected to study both Chinese and English language arts in an effort to develop their literacy in both languages. The instruction time for each language must be protected with diligence.

Since no research has yet determined the best ratio of English to the partner language in instruction, there is a great deal of variation in designing instruction models or the proportion of the two languages, particularly with one-way immersion (Howard et al., 2018). This situation applies to this case study's two one-way Chinese immersion programs. Each selected its own ratio of two-language instruction with a different language distribution in core subjects (Appendix 6).

Even though both schools adopted a 50/50 immersion model, their instruction model was strikingly different. In School B, the academic subjects of math, science, and social studies were taught in both languages of Chinese and English (for instance, a full day in Chinese instruction, including CLA, on day A, then the next day would be a full

day in English including ELA). This model enables an equal instruction time for biliteracy development of CLA and ELA as each language warrants a full school day to teach all academic subjects since the two languages alternate daily instead in the middle of a school day. School B's instruction design cultivated a much more nurturing environment to allow reciprocal learning to take place. Ultimately, the design enhanced and facilitated cross-language transfer to promote higher biliteracy.

In contrast, in School A, Chinese teachers were scheduled to teach CLA, math, and science for 50% of the school day, then ELA and social studies were conducted in English for the other 50% of the day. However, no special/enrichment classes were included.

In general, there are about 300 minutes of instruction time per school day. Following the instruction model, Chinese teachers should have 50% of the day for three subjects: CLA, math, and science. ELA and social studies were conducted in English for the other 50% of the day. Special classes were generally 45 minutes (15%) per day and rotated among five subjects, arts, library media, music, Social Emotional Learning (SEL), and Physical Education (PE). All the special classes were taught in English (15%), as well as bridge lessons of math and S.S (10-15%) and ELA (25%). Consequently, about 40% of the school day was left to teach math and science in Chinese, and 10% to Chinese literacy development. The two languages switched in the middle of a school day.

Since placing three subjects within half of the school day, teaching all three is challenging compared to two subjects. Subsequently, the three subjects were competing for the time within 50% of the day. Even though a 15% instruction time for CLA was scheduled, CLA time was not protected nor guaranteed. Most importantly, the

instructional structure did not provide students with the biliteracy environment they needed to be proficient in both languages. When the annual state mandate assessment was scheduled, math was authorized with priority subsequentially CLA was positioned as 'optional' since the CLA assessment results were not reported.

Given that Chinese is one of the most complex languages for native English speakers, it requires adequate language exposure and instruction time in Chinese for students to be proficient. The current design did not provide the optimal condition to meet the learning needs of the students to be bilingual and biliterate. According to the linguistic research, the model did not support biliteracy because it lacks cross-linguistic connections, which are crucial to building students' biliteracy of the two program languages. An important premise of language education is cross-language transfer, in which content learned in one language is also available in other languages (Cummins, 2005; Genesee et al., 2006).

The growing research supported the findings confirmed the positive effect of cross-language learning between two languages, regardless of whether the language is native or second (Linck et al., 2008). When one language is more developed, the more significant potential is for transfer into another language. Therefore, when students are instructed in two languages, and both languages are supported and promoted in the classroom, students are more likely to develop higher language proficiency (Melby-Lervag & Lervag, 2011).

Figure 3 contains two pie charts illustrating the committed Chinese and English instruction in teaching school subjects for grades 3-5. This proposed instruction design

integrates both languages into the learning of all core subjects in order to reflect the cross-language aspect.

The early Kindergarten through second grade follows an 80/20 model (Table 1) to prepare students with the required oral language and phonological awareness.

Figure 3

A sample of the proposed two language allocations in teaching school subjects for grades 3-5

Chinese instruction **for academic subjects**

- **Chinese language arts (CLA)**
- **Math**
- **Science**
- **Social studies (S.S)**
- **Specials**

English instruction for academic subjects

- **English language arts (ELA)**
- **Math**
- **Science**
- **Social studies (S.S)**
- **Specials**
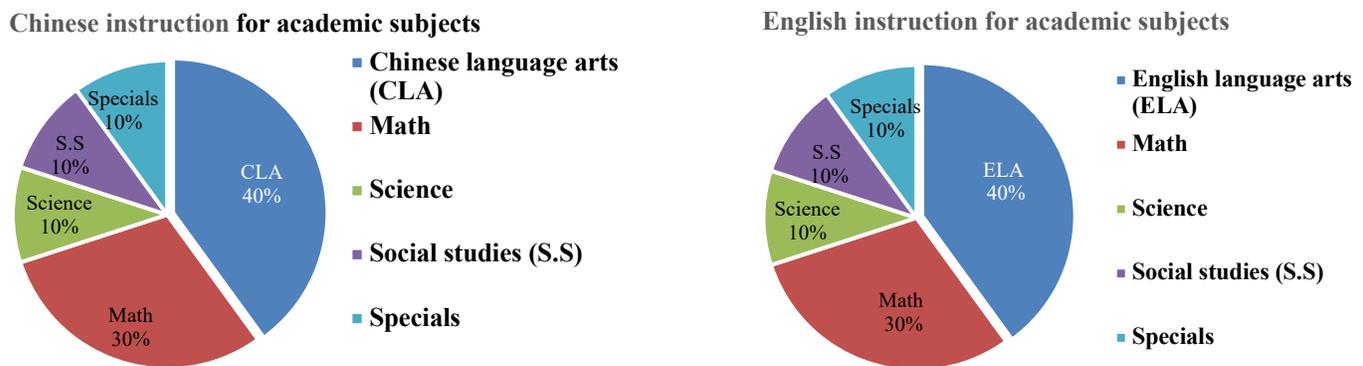
As shown in Figure 3, special classes are included in the Chinese instruction day. Even though students would benefit from learning special classes in both languages, it will be unlikely anytime soon due to a variety of factors, including the shortage of certified Chinese teachers, the concerns about possibly reducing English-speaking teachers, as well as administrators and parents' language preferences. If persistence with specials in both languages is pursued, these realities could create unnecessary conflicts.

In the new instructional model, CLA and ELA receive exclusive, protected, equal instruction time in all academic content, and students have ample opportunities to transfer language skills between the two. The new model promotes cross-language connections and reciprocity by fostering a mutually respected language learning environment. With

the content-based immersion approach, the model supports optimal language acquisition in meaning-focused contexts.

Research supports the rationale for the design. More recently, it has been shown immersion learners activate both languages concurrently as they learn them simultaneously, even if the two languages do not share the same linguistic system (Kroll & Bialystok, 2013). Due to the spontaneous nature of activation, immersion learners need to use cognitive resources to manage the activation and switch between two irrelevant languages, training them to be a "mental juggler" of the two languages (Freeman et al., 2016).

According to the research, bilinguals naturally switch between the two languages as part of their language usage (Myers-Scotton, 2002). Thus, it is posited that immersion students who learn content in Chinese will likely process it in their native English first. Just as a native Chinese learns English, words read or heard in English are first processed in Chinese. In a conversation, responses are produced in English upon code-switching between the two languages. Changing between two languages has become a daily process for a few years (from my own experience as a native Chinese speaker). Eventually, native Chinese speakers become proficient in English without switching from their first language. Chinese immersion students are exposed to Chinese for 80% of the school day in the early grades, so they will be able to switch between the two languages more quickly. Hoping they can begin processing Chinese directly without consulting their first languages soon.

By teaching academic subjects in both Chinese and English, the design also facilitates and strengthens collaboration between the two language teachers. The lesson

planning and learning activities need to be coordinated since they teach the same curriculum content. There is no repetition of content between the two languages, but they build on each other's progress in parallel. Through the partnership, ideas are exchanged and best practices are shared subconsciously through a reciprocity relationship. Consequently, the quality of literacy instruction improves over time to benefit the learners to achieve biliteracy.

A Whole-school versus a Strand Program within a School

The two Chinese immersion programs of this case study both implemented a 50/50 immersion model but with different instructional approaches. As a result, the statistical analysis indicated a distinct trend in the Chinese literacy trajectories of the two groups of students. School B, which adopted a total immersion of 100% Chinese for the early grades plus both languages in teaching the core subjects, demonstrated a higher level of Chinese literacy skills. While the study sheds some light on the effectiveness of instructional approaches, instruction design is not the only factor influencing learning outcomes. Several variables could have contributed to students' higher academic performance in School B, such as the PYP[26] curriculum as an IB world school, teaching materials, community support, parents' involvement, students' motivation, teacher retention, and leadership team. Additionally, the whole school program model at School B could be one of the crucial variables.

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[26] PYP is an educational program managed by the International Baccalaureate (IB) for students in grades Kindergarten to Fifth grade.

According to the DC LIP (n.d.), historically, the whole school programs have been viewed as a more beneficial model because of the following;

- Increasing immersion program access to a broader student population
- Overall higher-level performance narrows the achievement gap
- Improvements in unsustainable school culture
- Using school resources more efficiently
- Providing equal access to everyone

A strand program is generally situated in a traditional school as School A. In contrast, a strand program model lacks what a whole-school model can offer. Only a tiny percentage (about 20%) of the school student population can be admitted by a lottery system due to the limited seats. Community perceptions and expectations could influence how the language immersion program is implemented. Decisions on which language to use when and with whom, how to allocate the two program languages in learning content, and which language to use for assessment or accountability explicitly and implicitly make a statement about what cultural capital is valued in school (Shohamy, 2006).

Researchers have found that program and school intersections are essential. Immersion teachers and students may experience adverse effects on resource access, expectations, social integration, and academic achievement if they are perceived as a separate group from the school but not part of the school community (de Jong & Bearse, 2014). In contrast, integrating an immersion program into a larger school environment enhances its effectiveness. Immersion programs and schools work together to produce high levels of student achievement through a reinforcing interactive relationship. In order to achieve program objectives, interdisciplinary, integrated approaches that are systemically supported within the school are essential (Carter & Chatfield, 1986). Thus,

strand programs can achieve program goals with a robust support system, even though a

whole school approach might offer more promising prospects.

However, whether improving language education should be solely focused on

increased academic achievement or increased access to all children remains. The clear

distinction outlines

in the 2017 final report by the American Academy of Arts & Science (AAAS)

Commission on

Language Learning[27]

> The ultimate goal of any coordinated effort to improve language learning
> —for students, parents, school districts, states, and the nation as a whole
> —should not be a standardized pursuit of a particular level of competency,
> but improved access to language education for all U.S. citizens, irrespective of
> geography, ethnicity, or socioeconomic background (AAAS, 2017, p.8).

In contrast to the two models, a whole school program may be able to achieve

both goals-increased academic achievement and increased access for all without

compromising either of them.

Discussion

The instruction design proposed in this paper was based on the review of current

research and analysis of the biliteracy achievement data for the two programs in the ELP

case study. Accordingly, the proposed changes highlighted the benefits of early literacy,

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[27] The Commission on Language Learning, formed in 2015 as a response to bipartisan
request form the US congress by the American Academy of Arts & Sciences to evaluate
the state of foreign language learning, education needs assessment with recommendations
and goals setting (AAAS, 2017).

the importance of committing time to Chinese literacy, and the need for cross-linguistic connections across core subjects.

In the study, School B students demonstrated more positive biliteracy trajectories than School A students; however, the Chinese literacy goal was only partially reached based on the target measurement of 80% established for DE and Utah Chinese immersion programs. English continues to be privileged in both academic and social contexts of language immersion schools; regardless of the immersion program models (Babino & Stewart 2017), the goals of bilingualism and biliteracy continue to be challenging to achieve.

In addition, district or school stakeholders should be aware that biliteracy development is affected by many variables beyond instruction design, literacy instruction strategies and best classroom practices discussed in this paper. At the very least, some inherent school contexts should not be overlooked or ignored. For example, a Chinese immersion student of a native English speaker may have limited opportunities to practice or use Chinese outside the classroom. Other immersion programs also faced similar challenges. Study results by Lyster (2007) indicate that immersion learners frequently struggle to achieve native-like proficiency in their partner language. Language learning is hindered by the lack of opportunities to practice with native speakers of the partner language. Students attending a strand program that operates alongside an English-dominant school will have more challenges using the partner language. Students are more likely to prefer English when interacting informally or socially with their peers and teachers (Lyster, 2007).

Thus, school leaders are encouraged to leverage 21st-century technology by connecting immersion students with Chinese native speakers via Zoom or Skype. The virtual connection is intended to facilitate communication between Chinese immersion learners and native Chinese learners of English. Both sides of the equation benefit from this approach; Chinese immersion learners practice their Chinese with Chinese native speakers, while Chinese native speakers practice their English with Chinese immersion learners. Having meaningful interaction on real-life topics will help participants better understand each other's cultures and motivate them to practice more to improve their linguistic abilities. Ultimately, Chinese proficiency is determined by how well learners are able to perform various language functions in real-life situations in Chinese. Ideally, these virtual zoom lessons could be pedagogically integrated into the Chinese literacy curriculum. Language content embedded in the Chinese literacy curriculum is used to set the objectives of each virtual class.

Bilingualism is associated with enhanced cognitive, linguistic, and academic development when both languages are allowed to develop and flourish (Cummings, 2000). These findings should be taken into account by school leaders when implementing language immersion programs. In light of these realities, school stakeholders should be more committed to partner language literacy development to achieve the program goal of biliteracy.

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ARTIFACT 8: PRESENTATION OF FINDINGS
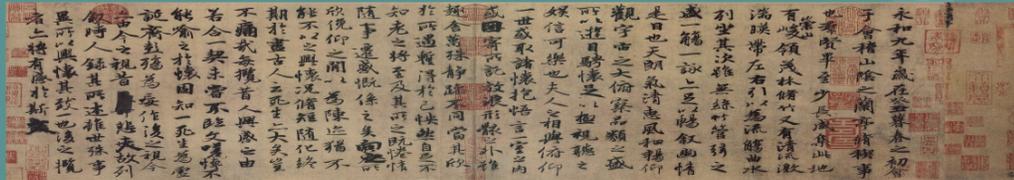
What Does the Research Say?

Introduction and Research background

- Instruction design is one of the critical components in the success of language immersion

- Achieving biliteracy goal heavily relied on instruction design

  1. How the two languages are used in teaching academic subjects
  2. The ratio of the two language are allocation to support literacy of each language

  (Fortune, 2008; Genesee et al., 2006; Montecel & Cortez, 2002; Tabors & Snow, 2001).

- A case study findings of two Chinese immersion programs

- Instruction design influenced students' learning outcomes

2

Assessment Data on CLA, ELA and Math

Chinese Immersion (CI) students outperformed their non-immersion peers in ELA and math while very small percentage of CI students reached the grade-level Chinese literacy proficiency. Biliteracy goals were not fulfilled.

Academic Report (2018-2019)
School A: 5th Grade Chinese Immersion Students

Math: 94%, 44%
ELA: 88%, 53%
CLA Reading & Writing: 19%, 14%

■ 5th Grade: Chinese Immersion Students
■ 5th Grade: Non-Immersion Students (Statewide)

CLA: Chinese Language Arts ELA: English Language Arts
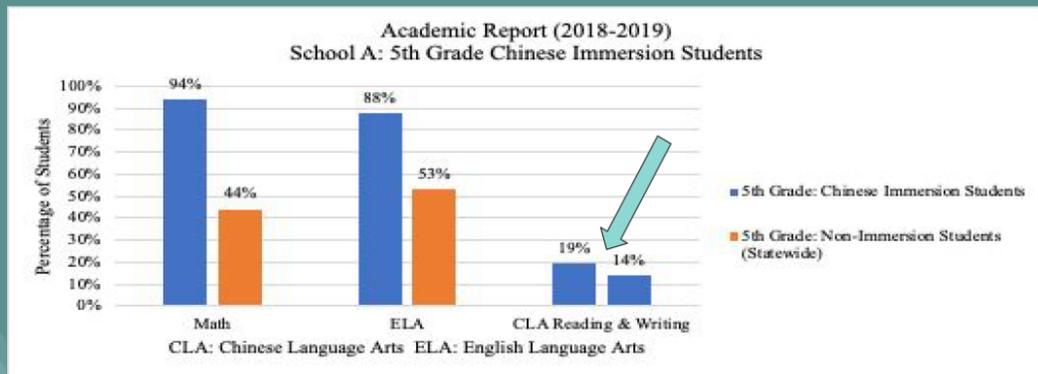
3

How to improve Chinese literacy?

The case study findings uncovered some essential elements of instruction design to improve Chinese literacy development;

- ➔ Early oral language development
- ➔ Adequate instruction time for Chinese language arts
- ➔ Academic subjects in both languages

4

What research say?

- Early Oracy development is essential for later reading comprehension and highly correlated with school overall achievement (Reeder et al., 2017, Spencer et al., 2013)

- Learn to read and write in Chinese requires a much longer time commitment to develop Chinese literacy skills (Met, 2012, FSI, n.d.) A need for formal instruction in the partner language to improve literacy (Ballinger, 2013; Lyster, 2007; Swain & Lapkin, 2013).

- The language of instruction is the crucial contributor (Howard et al., 2018). Students are instructed in two languages, students are more likely to develop higher biliteracy proficiency (Melby-Lervag & Lervag, 2011; Linck et al., 2008).

5

Research-informed Recommendations

- Early oral language development to enhance upper grades literacy proficiency

- Committed instruction time to improve Chinese literacy proficiency

- Academic subjects in both languages to enhance cross-language transfer

Recommendation
Early Chinese Oral Language Development (k-1)

Proposed language allocation from kindergarten to fifth grade

Grades	k-1st	2nd	3rd	4th	5th
Chinese	80%	65%	50%	50%	50%
English	20%	35%	50%	50%	50%


Proposed time allocation in both languages for k-5

249
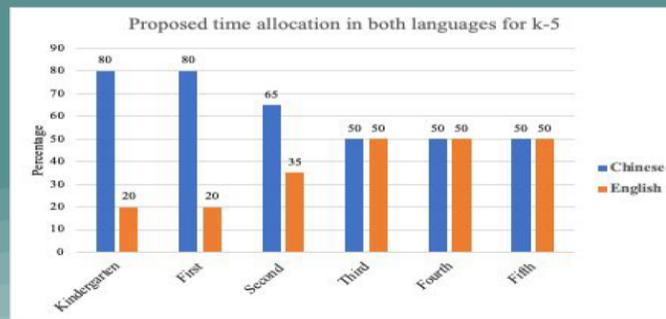
Reciprocity of two language transfer (3-5) & Increase instruction time for CLA

Teaching Academic Subjects in both languages of Chinese and English
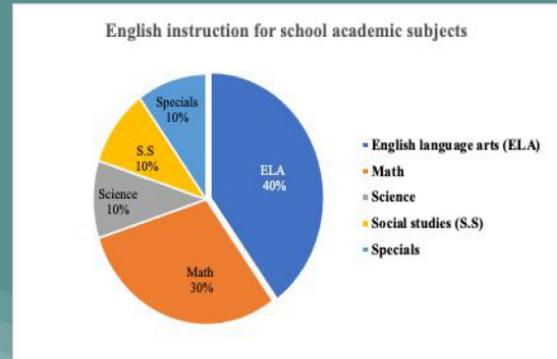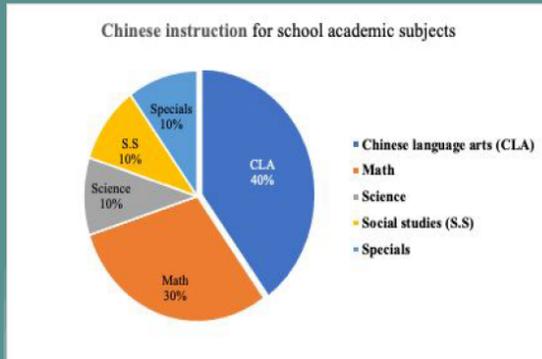
Conclusion

- The findings highlighted the importance of instruction design in biliteracy development of one-way Chinese immersion program.

- The indisputable realities of English continues to be dominated in both academic and social contexts of immersion schools, the goals of biliteracy continue to be challenging to achieve (Babino & Stewart 2017).

- School stakeholders are urged to be conscientious of Chinese language literacy development to achieve the program goals of biliteracy.

Contact: lililin@udel.edu

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13

谢谢! xiè xiè!

14

Appendix I

ARTIFACT 9: SUMMARY OF STUDY FINDINGS

Introduction

Several research studies identified that instruction design is one of the most critical components in the success of language immersion programs. The primary goal of language immersion is to produce biliterate and bilingual graduates. Biliteracy development depends on how the two languages are used to teach academic subjects and how the two languages are allocated to support each language for biliteracy development (Fortune, 2008; Genesee et al., 2006; Montecel & Cortez, 2002; Tabors & Snow, 2001).

A critical difference between language immersion and traditional language programs is that the non-English target language functions as a vehicle for accessing content. Therefore, it is vital for the learner to achieve the necessary grade-level Chinese proficiency to continue their studies in mastering academic content. In addition, the remarkable differences between Chinese and English further highlighted the crucial role effective instruction design can play in helping native English speakers become biliterate in a one-way[28] Chinese immersion program.

Thus, this case study focused on the instruction design of two Chinese immersion programs to investigate whether students' Chinese literacy learning outcomes differ despite the two programs sharing the same one-way immersion model. The study refers to the two programs as School A and School B. The results of biliteracy data analysis revealed two distinct trends of Chinese literacy trajectories and validated instruction

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[28] Majority of learners in one-way immersion programs are native English speakers.

design played a crucial role in Chinese literacy development. The effects of instruction design are reflected in early literacy development, adequate instruction time in Chinese language arts, and two language transfer in teaching academic subjects.

Assessment Data on Chinese Literacy Proficiency

The academic report of 2018-2019 for the 5th grade Chinese immersion (CI) students indicated the outstanding performance of the CI students on the state mandate accountability assessment in English language arts (ELA)and mathematics. Based on the public record on the statewide test results of these two subjects, Figure 1 below illustrates how the CI students performed compared to their non-immersion peers statewide and the test results of CI students on Chinese language arts (CLA) measured by AAPPL[29].

Figure 1

School A: The fifth-grade immersion students' performance on CLA, ELA and math (2018-2019)

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[29] AAPPL stands for the **ACTFL Assessment of Performance toward Proficiency in Languages** is a common core aligned and web-based proficiency assessment of K-12 standards-based language learning.

Academic Report (2018-2019)
School A: 5th Grade Chinese Immersion Students

CLA: Chinese Language Arts ELA: English Language Arts
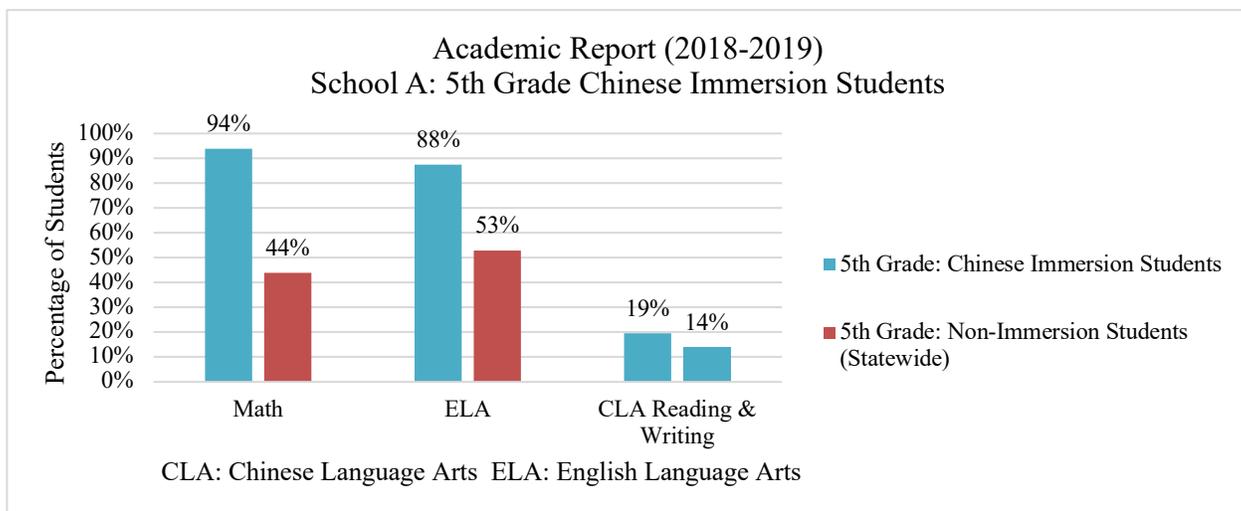
As shown in Figure 1, CI students outperformed their non-immersion peers statewide in math by 50 points and 35 points in ELA. However, only a small percentage of students reached grade-level proficiencies in reading and writing in Chinese.

These results are consistent with other research findings. In general, language immersion students outperformed their non-immersion peers or performed equally well, if not better (Lindholm-Leary and Genesee, 2014, Steel et al., 2017, Watzinger-Tharp et al., 2018). However, despite the academic success of language immersion programs, literacy deficiencies in the non-English target language remain a major concern (Tedick & Cammarata, 2012).

How to improve Chinese literacy?

Due to the relatively new nature of Chinese immersion in the public education system, minimal research has been conducted on effective instruction design for Chinese literacy. However, research on bilingual education and Spanish language immersion is available.

From this research, as well as the findings from this study of two Chinese immersion programs, the following essential elements of instruction design are recommended:

- Early oral language development to boost literacy skills in upper grades

- Adequate instruction time to improve Chinese literacy proficiency

- Academic subjects in both languages to enhance cross-language transfer

Recommendations

Early literacy Instruction Model

Existing research findings demonstrate the overwhelming influence of early literacy in immersion programs. Early literacy investment is critical, and invested time in oral language development yields high-level literacy skills (National Literacy Institute (NLI), 2009). It has been identified in early literacy studies that oral language development is essential for later reading comprehension, as well as phonological awareness in the early years (Spencer et al., (2013). Literacy development starts early in school and is highly correlated with school achievement (Reeder et al., 2017). Participation in early bilingual education positively shapes students' academic achievement (Roscigno et al., 2001).

In terms of proficiency in the non-English target language, several longitudinal studies have shown students demonstrate higher levels of proficiency in the target language in the 90:10 model in the early grades compared to the 50:50 model (Lindholm-Leary, 2001; Lindholm-Leary & Borsato, 2006; Lindholm-Leary & Howard, 2008).

Given the empirically supported theories behind bilingual education, the recommended instruction model for early grades is an 80/20 split. Figure 1 below illustrates the early instruction model that begins in Kindergarten and first grades, where instruction in Chinese is scheduled 80% and 20% in English. The design intends to increase early Chinese language exposure for oral literacy.

Figure 1

Proposed two language instruction allocation from k-5
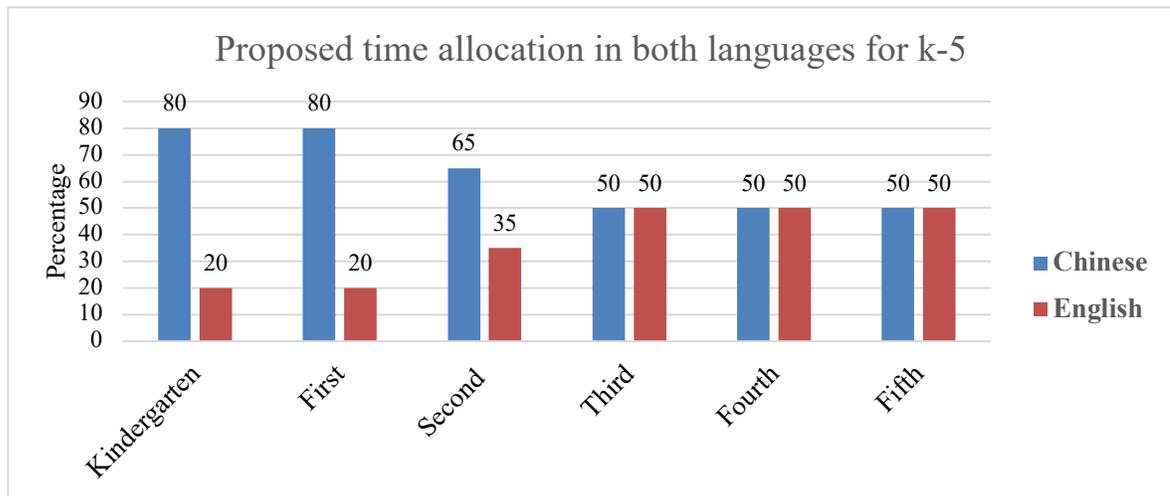
From grade two onward (Figure 1), Chinese instruction gradually decreases to 50%, and English instruction increases until third grade, when Chinese instruction and English instruction are equally divided.

The proposed early immersion model aims to establish early solid oral literacy skills so that Chinese literacy skills will be more advanced in upper grades. Immersion students enter middle school with strong biliteracy skills in Chinese and English. Thus, the students are prepared with the necessary Chinese literacy skills to continue their studies in secondary school successfully.

**Adequate Instruction Time to Improve Chinese Literacy Proficiency**

As Howard et al. (2018) suggested, the key contributor to performance is instruction time, the primary variable between the models and instructional language. In designing a language immersion instruction model, the language of instruction and the ratio of the use of English to the use of the target language for instruction are essential (Howard et al., 2018).

In light of the different writing systems, learning to read and write Chinese takes longer than in other languages, and this is not only true for non-native speakers. It is also true for native Chinese speakers because the complexity and different linguistic system of Chinese requires a much longer time commitment to develop Chinese literacy skills than in alphabetical languages (Met, 2012).

In the case study, biliteracy data demonstrated that adequate instruction time was crucial for Chinese literacy development, supporting the above statement. In addition, statistical analysis of the achievement data revealed a strong correlation between time invested and Chinese literacy learning outcomes. The more time invested, the higher the test scores. Figure 2 below illustrates how the two groups of students performed with different instruction schedules in Chinese.

Figure 2

Performance on three Chinese language skills between School A and School B
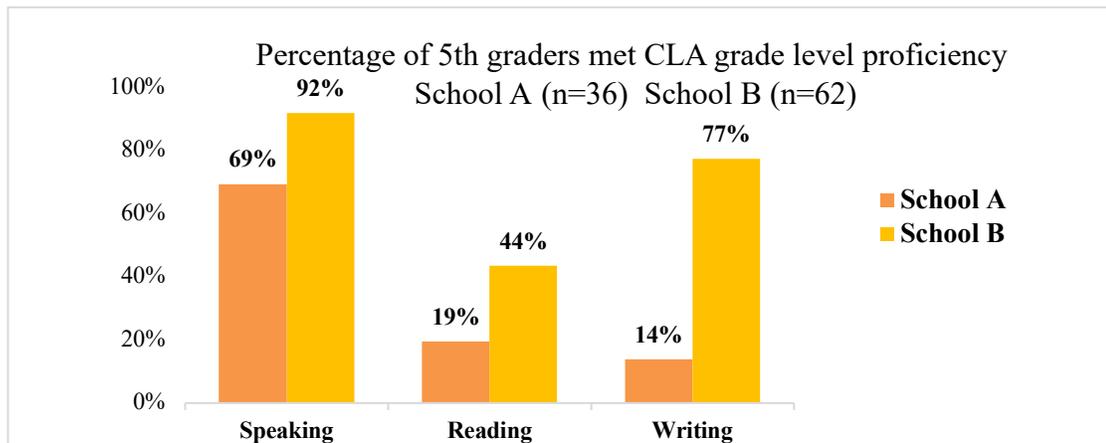
School A students received about 20-39 minutes for Chinese language arts daily and School B received about 110-139 minutes daily. Overall, School B students performed better in all three skills, particularly reading and writing.

This finding can be substantiated by the empirical study of language learning timelines summarized by the Foreign Service Institute (FSI) (n.d.). FSI categorizes Chinese as one of the exceptional complex languages for native-English learners. Based on more than 70 years of language teaching experience to U. S. diplomats, FSI estimated it takes about 88 weeks (equivalent to 2200 class hours) to learn Chinese to reach 'Level 3' proficiency. In contrast, it takes about 24 weeks (600 class hours) to achieve a similar proficiency level for alphabetic languages, such as French, German, Italian, or Spanish (FSI, n.d.).

The language guidelines suggested a learner would need triple the time to learn Chinese compared to learning an alphabetic language to reach a similar level of language proficiency. According to these data, Chinese instruction should take twice as long as alphabetic-based languages, if not triple that time.

These studies suggest that sufficient instruction time for Chinese language arts is necessary for learners to become proficient in Chinese. Therefore, the recommended instruction time is shown in Figure 2, where instruction in Chinese and instruction in English would alternate daily.

Figure 2

Proposed language instruction distribution in academic subjects

Chinese instruction for academic subjects

- Chinese language arts (CLA)
- Math
- Science
- Social studies (S.S)
- Specials

CLA 40%
Math 30%
Science 10%
S.S 10%
Specials 10%

English instruction for academic subjects

- English language arts (ELA)
- Math
- Science
- Social studies (S.S)
- Specials

ELA 40%
Math 30%
Science 10%
S.S 10%
Specials 10%
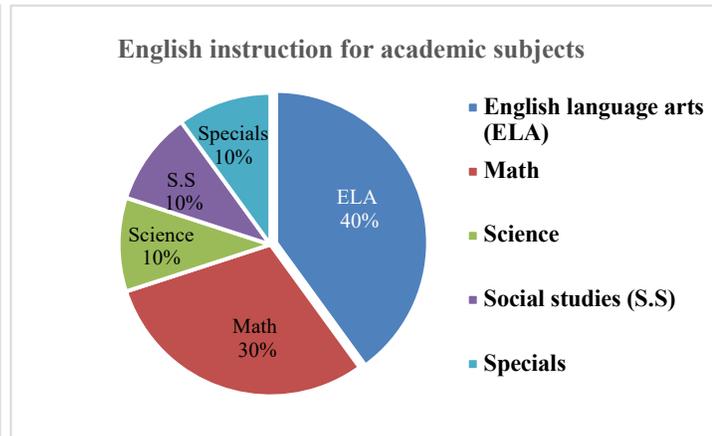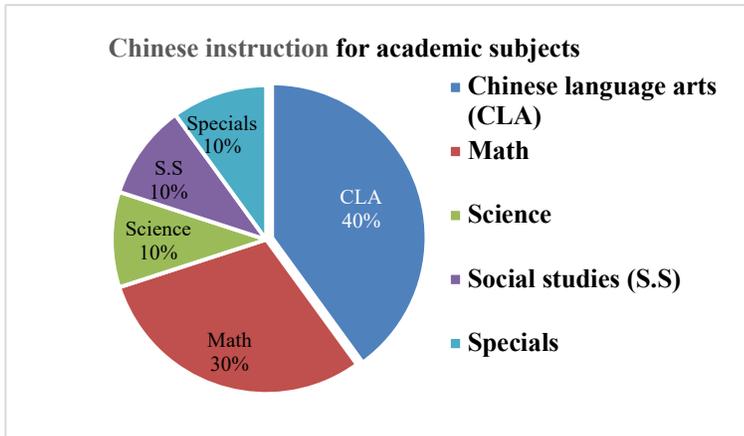
Generally, there are about 300 minutes of instruction time per school day. The recommended 40% instruction time for CLA is approximately 120 minutes per day. The proposed time increased from the current 10% to 40% for CLA.

Academic Subjects in Both languages to Enhance Across-language Transfer

Kennedy (2019) highlights the importance of a well-designed language allocation plan to achieve biliteracy of immersion program goals. Promoting equity between the two languages and supporting program goals, instruction is systematically assigned in each language and across content areas. Thus, Chinese immersion learners are expected to study both Chinese and English language arts in an effort to develop their literacy in both languages. The instruction time for each language must be protected with diligence. The proposed equal instruction time for each of the two languages' literacy development reflects the core component mentioned.

Additionally, the linguistic research advocates cross-language connection and regards cross-language transfer between the two languages as the promising foundation for building students' biliteracy. Because cross-language transfer reinforces the content learned in one language is also available in the other languages of the learner (Cummins, 2005; Genesee et al., 2006).

In recent years, research has confirmed the positive effects of cross-language learning between two languages, regardless of whether the language is native or second (Linck et al., 2008). When one language is more developed, the more significant potential is for transfer into another language. Therefore, when students are instructed in two languages, and both languages are supported and promoted in the classroom, students are more likely to develop higher language proficiency (Melby-Lervag & Lervag, 2011).

In the new instructional model, CLA and ELA receive exclusive, protected, equal instruction time in all academic content, and students have ample opportunities to transfer language skills between the two. With the new model, bilingual language learning is facilitated through cross-language connections and reciprocity. Hope the research informed new model could mitigate the Chinese literacy deficiencies and promote biliteracy development.

Conclusion and Implication for practice

The instruction design proposed was based on the review of current research and analysis of the biliteracy achievement data for the two programs in the case study. Accordingly, the proposed changes highlighted the benefits of early literacy, the importance of committing time to Chinese literacy, and the need for cross-linguistic connections across core subjects.

In the study, School B students demonstrated more positive biliteracy trajectories than School A students; however, the Chinese literacy goal was only partially reached based on the target measurement of 80% in School A. English continues to be privileged in both academic and social contexts of language immersion schools; regardless of the immersion program models (Babino & Stewart 2017), the goals of bilingualism and

biliteracy continue to be challenging to achieve. In light of these realties, the school

stakeholders are encouraged to be more conscientious of Chinese literacy development so

that biliteracy can be accomplished.

Bilingualism is associated with enhanced cognitive, linguistic, and academic

development when both languages are allowed to develop and flourish (Cummings,

2000). These findings should be taken into account by school leaders when implementing

language immersion programs.

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