ABSTRACT

Zarmina Hotaki, DUAL LANGUAGE LEARNING: USING FIRST LANGUAGE AS A SCAFFOLD FOR SECOND LANGUAGE ACQUISITION AND LEARNING (Under the direction of Dr. Matthew Militello). Department of Educational Leadership, May 2021.

For most English language learners, translanguaging strategies applied in a fully inclusive classroom are most effective for acquiring second-language competency. However, teachers of non-language subjects such as math and science are often unaware of translanguaging techniques and may be resistant to using them as outside their area of competence or responsibility. We carried out participatory action research (PAR) to help secondary science and math teachers to develop practices to support ELLs in a school with a high proportion of Arabic-speaking students. After two cycles of inquiry in which co-practitioner researchers and the principal jointly planned scaffolding lessons and conducted follow-up observations and conversations, adoption of the new techniques was still impeded by teachers' insecurity about their own language skills and their reliance on prior experiences and beliefs to guide classroom decisions. In addition, the micropolitical context did not fully support language development in content classrooms. A more personalized coaching approach would aid teachers in incorporating new pedagogical structures, especially if schoolwide policy and professional learning opportunities are supportive.

DUAL LANGUAGE LEARNING: USING FIRST LANGUAGE AS A SCAFFOLD FOR SECOND LANGUAGE ACQUISITION AND LEARNING

A Dissertation

Presented to

The Faculty of the Department of Educational Leadership

East Carolina University

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Education in Educational Leadership

by

Zarmina Hotaki

May, 2021

DUAL LANGUAGE LEARNING: USING FIRST LANGUAGE AS A SCAFFOLD FOR SECOND LANGUAGE ACQUISITION AND LEARNING

by

Zarmina Hotaki

APPROVED BY:

DIRECTOR OF DISSERTATION:_____
Matthew Militello, PhD

COMMITTEE MEMBER:_____
David Siegel, PhD

COMMITTEE MEMBER:_____
Lawrence Hodgkins, EdD

COMMITTEE MEMBER:_____
Lynda Tredway, MA

CHAIR OF THE DEPARTMENT OF EDUCATIONAL LEADERSHIP:

_____
Marjorie Ringler, EdD

DEAN OF THE GRADUATE SCHOOL:

_____
Paul Gemperline, PhD

DEDICATION

This dissertation is gratefully dedicated to my loving mother, Mosina Hotaki, who has been a source of inspiration and a pillar of strength my entire life.

ACKNOWLEDGEMENTS

I would like to start by thanking the Almighty for the countless gifts and opportunities provided to me. I would like to thank my husband, children, brothers, sisters, and extended family for their love and support.

I wish to thank the director of my dissertation Dr. Mathew Militello, for his time, and guidance. I would like to express my deepest gratitude to Lynda Tredway for her support. It was an honor to work under her supervision. She provided encouragement, inspiration, and comprehensive advice for this study.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1: NAMING AND FRAMING THE FOCUS OF PRACTICE (FoP)

An inclusive classroom is the right of every student, and this participatory action research (PAR) project is aimed at ensuring that every English language learner (ELL) has the fullest access to classrooms that support their learning (Cummings, 2000; Garcia, 2009; Krashen, 2003). For many years, the first response to teaching English was to separate students from their age peers who were fluent in English. In the case of newcomers to the U.S. education system, that is still appropriate (Hart & Lee, 2003). However, for most ELLs, the fully inclusive classroom with appropriate pedagogical and social supports is a better option. In general, the increase in ELLs cannot be adequately supported in a mainstream classroom with other students who speak English as a first language if the proper supports are not in place (Janzen, 2008).

With the many changes occurring in schools with language learning, most experts agree that language theory is consistent with the philosophy of not shunning the first language and looking at it as an asset to language learning (Cummins, 2000; Garcia, 2009; Krashan, 2003; Martinéz et al., 2019). In another view, Hart and Lee (2003) explore the importance of the teacher's philosophy and beliefs on language integration in science and math classes and how they can either support ELLs or hinder their progress in these classes. As educators, we should be cognizant of the diverse learners in our classrooms and avoid teaching to the average student while ignoring those who require language supports to fully access English and subject content (Garcia, 2009). We have made great strides in working with ELLs by providing the necessary English language support in language classes as most qualified ESL or ELL teachers usually teach language and literature classes. It is now time to offer that same level of support in math and science classes. Since language acquisition programs have served thousands of teachers all across the US and international, we are not starting from scratch to know how to accomplish the

task of bringing language learning into science and math classes (Karlsson et al., 2019). We can honor the past by using the successful support programs that have worked for many schools to support ELLs but need to move to other processes and subjects to fully support ELLs.

Currently, ELLs are no longer outliers but a reality in most schools. Like any form of diversity, this brings increasing complexity to classrooms. The more complex the academic course, such as secondary science and math, the more innovative our lesson plans and unit design must be to reach all our students. When second language learners are in classes, we must understand and design lessons with language considerations. Typically, content teachers, particularly math and science teachers, are not prepared to teach language strategies so that students can understand the complex vocabularies that come with many different subjects. Yet, without these supports, students are unable to be successful language learners or learners of content in classes.

Not only does the model require a more inclusive approach but consistent social and emotional support. When educators acknowledge that a learner may be struggling in a course because of language and provide scaffolding, learners do better (Baker, 2017). Language learners thrive in situations in which the practice and implementation of specific strategies allow for stronger long-term memory of subject-specific vocabulary in the second language (Sorenson & Paradis, 2016). When the first language is used as one of the strategies to support second language learning, it facilitates both language learning and subject comprehension (Garcia, 2009; Karlsson et al., 2019). In his work on language proficiency, Cummins (2000) explored the importance of content knowledge in the first language and the role the first language plays in learning a second language. Krashan (2003) explored in his language acquisition model the positive role the first language can have when learning a second language. The importance of

educators having a philosophy and belief system that the first language is an asset and not a barrier can be beneficial to student outcome and affect student success (Garcia, 2009). When educators support learners in grasping the second language, they can close the achievement gap faster in non-language subjects.

In this chapter, I provide rationale for the participatory action research (PAR) study, discuss the focus of practice for the project, and describe the implementation process. The rationale includes the assets and challenges within the organization; to capture the assets and challenges, a fishbone diagram is included. I discuss the significance of the study and why I find it is an essential area of study. I have attached the significance to issues of equity. I then present the purpose statement and actionable research question that the study hopes to answer as well as the guiding theory of action, aim, and project design. The chapter concludes with confidentiality and ethical considerations.

Focus of Practice

I currently live in the US and work in an International Baccalaureate (IB) school in the DC metro area. Ninety percent of our students are Arabic A and English B learners, meaning they are English language learners (ELLs) whose first language is Arabic. I direct the middle years program for Grades 6 through 10, and I am working with two 10^{th} grade science and math teachers.

Students at the school encounter difficulties in non-language subjects due to subject-specific vocabulary, especially in science and math classes. Many teachers use strategies to teach the second language without relying on the support of the first language. The focus of practice is to examine how first language use could be used to scaffold second language acquisition and learning. Thus, I determined what types of language scaffolding from the first language best

supported students to understand the overall objectives for topics mostly presented in their second language. I was interested in how professional development opportunities can better provide math and science teachers knowledge and skill in using Language 1 to better teach the math and science content classes that are typically taught only in English. Finally, I examined how developing this program supported me as a school leader. The FoP is important because so many students are now missing important content because of language proficiency challenges. I have made the decision to work in this area based on the fact that demographics in many schools are changing, and language support is an integral part of our responsibility as teachers. However, when we hold teachers accountable to this requirement, we need to provide them with the tools they need.

Analysis of Assets and Challenges

The school has both assets and challenges that play roles in the focus of practice that appear at different levels of the organizational structure: micro context of the 10th grade, the meso context of the entire school, and the macro or structural policy and political contexts. I used the fishbone diagram to analyze the current situation at the school (see Figure 1); the visual representation is the product of the many discussions I had with both the administrative team and the Co-Practitioner Researcher (CPR) group (Bryk et al., 2015). I discuss the CPR members, the group of practitioners who supported me with the participatory action research, in more detail in Chapter 3. Bryk et al. (2015) state that the fishbone diagram helps practitioners pinpoint the key factors that are contributing to an unsatisfactory outcome; an innovation to the fishbone is a focus on the assets that we can bring to the forefront to address the challenges (Rosenthal, 2019). The method requires us to discuss the relationship between students' poor performance in both math and science subjects and language issues (see Figure 1 for assets and challenges).

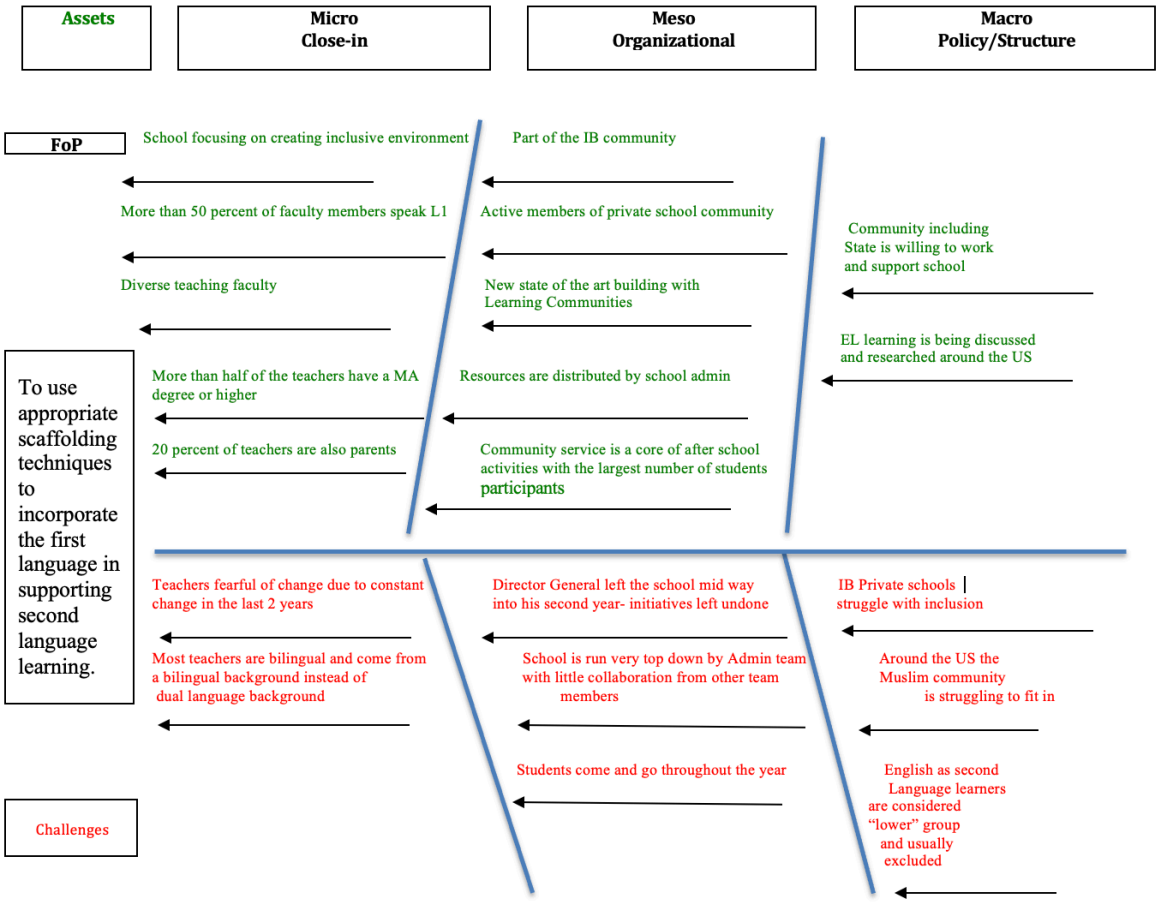


Figure 1. Fishbone diagram of the micro, meso and macro assets and challenges.

Assets

A significant asset at the micro level was the diverse teaching team. Because many members of the team speak the mother tongue of many of our students (Arabic), translation and support in the first language was not a barrier in most classes. Twenty percent of our teachers are parents and had sincere commitments to improving the learning outcomes because they are investing in their children.

At the meso/organizational level, our assets include generous resources; our teachers are part of a greater IB community and take part in other private school community events. Our school plays sports with other schools and takes part in shared professional development projects. The school opened a new state-of-the-art building with STEM labs and learning communities built into each section. All resource distribution is made at the administrative level, allowing us to purchase what we need without board approval.

At the macro/policy and political level, we are an older school with 35 years of experience. Many of our policies and "business" are well-developed. When we have asked community and state members for support, they both have been willing to help us.

Challenges

Yet, despite all the assets available to support the study, there also were significant challenges. At the micro level, many teachers feared change. The school had seen drastic changes in the recent years, and many seemed unhappy when change conversations occur. With change comes the possibility that the proposed change will not fully succeed, and many teachers are highly concerned that we maintain a focus on learning English, reflecting a lack of awareness of the new research on the benefits of bilingualism and translanguaging. Many teachers are bilingual but had not worked in an environment with large groups of ELLs.

Many studied English and were so immersed in English that they began to lose Arabic fluency. At the meso/organizational level, the school had a typical hierarchical management style with limited collaboration from teaching members; thus, initiating a significant change that is primarily directed by teachers is not typical.

In addition, the Director General of the school left the school a year and a half into the move to the new building with many planned initiatives unfinished. Many students (30-40%) were enrolled in the school for only a short period, and others had to leave to travel to their home countries throughout the school year. The school culture viewed the ELLs as a challenge. The school struggled with its identity as an IB World school with little diversity in the student body.

The policy changes by the board or leadership team at the request of the governing board did not always follow the best practices that the teaching staff knew and used. ELLs often are considered burdens in school systems as they require more resources and supports. Finally, the Muslim community experienced larger struggles of identify and feelings of fear because of the treatment of Muslims both worldwide and in the US.

Connection to Equity

Language learning is a key issue of equity because language learners need to be provided with the necessary support if they are to be successful in schools. Not speaking English as a first language in U.S. schools hinders students especially in certain subjects that require strong language skills because of discipline-specific vocabulary. Students often cannot grasp the material taught in a given subject area because of lack of fluency in the new language even though they might be able to express the concepts in their first language (see Table 1)

Three equity frameworks influenced the FoP: socio-cultural, psychological, and philosophical. In the study school, we have sufficient resources to address the issue; however, in

Table 1

Equity Frameworks that Impact FoP

How can the first language be used to scaffold second language acquisition and learning?

Philosophical	Psychological	Socio-Cultural
Mills (1997) in the *Racial Contract* addressed our inability to address cultural diversity due to both our lack of power and our lack of desire. This FoP is an issue of inequality in the classroom and learning environment that has a negative ramification on learning. This FoP also looks at how one language dominates and is seen as superior to other languages.	Steele (2010) discusses the stigma threat that individuals face, leading to underperformance. English language learners who are not made to feel included in the classroom community or are looked upon as lower functioning students experience this stigma threat that leads them to underperform.	This framework is relevant to the FoP in that as Gutiérrez (2016) believes the humanist approach to the learning science is not only relevant but also vital. Language learning is a socio-cultural aspect of learning and connects learners to their culture, morals, values, and social practices. In the effort to learn the second language, we do not want to lose the mother tongue.

many schools with large numbers of ELL students, budget constraints are significant in providing the most equitable learning environment.

Significance

The PAR study is significant because classroom dynamics are changing in many schools; as our society has become more diverse, our student profile is changing along with it. Second language learners are a reality in almost all classrooms across the US. The culture of second language learning has changed; we no longer want students to learn a second language at the expense of their mother tongue. To better understand and support ELLs, we must understand language learning and memory. To this end, I analyzed language and memory research to understand better which strategies would work best when using the first language to support the learning of a second language.

Purpose Statement and Research Questions

The purpose of the participatory action research (PAR) was to focus on language practices in secondary math and science classrooms to determine how using the learners' mother tongue or first language to support second language learning could benefit ELLs. The overarching question is: How can the first language be used to scaffold second language acquisition and learning?

The sub-questions that guide the participatory action research include:

- For Arabic-speaking students who are learning science and math in English, what pedagogical structures best support them?
- To what extent does professional development for teachers support their ability to incorporate pedagogical structures that use the first language in assessments and

lesson explanation to allow students to demonstrate learning in classes that are taught in English?

- How can the work on the PAR project with a team of co-practitioner researchers support my leadership development?

The sub-questions address specific, actionable items that involve implementation in the classroom. I collected data with the CPR team to determine how using the first language as a scaffolding tool was beneficial to learning a second language.

Theory of Action, Aim Statement, and Driver Diagram

The theory of action is: If teachers provide ELLs in math and science classes with tools using the first language, teachers will increase their capacity to serve students equitably. The primary aim of the PAR is to use appropriate scaffolding techniques to incorporate the first language in supporting second language learning.

Table 2 illustrates the groups I worked with on the PAR and who influenced and promoted the initiatives. The CPR team supported the PAR implementation and the reflection processes. The driver diagram depicts the main and secondary drivers that played a role in both implementation, collection of data, and discussion on continuing change and improvements during the different PAR cycles.

Proposed PAR Project Design

The participatory action research (PAR) study includes two iterative cycles of inquiry. The first PAR cycle started in August 2019 and ended in October 2019. The second cycle started in November 2019 and was completed by February 2020. The methodology in the two

Table 2

Driver Diagram

AIM	Primary Drivers (CPR Group)	Secondary Drivers
To use appropriate scaffolding techniques to incorporate the first language in supporting second language learning.	The Grade 10 math and science teachers will work with all students and will scaffold using language 1. They will participate in the member checks. MYP coordinator (lead researcher) will work with teachers to observe classrooms, analyze evidence from classroom observation, and coach the two CPR team members (teachers) on language learning and the amount of scaffolding that is both permissible based on IB regulations and good practice. MYP coordinator will collect and review assessment data and meet with both teachers and learners in focus groups and conduct member checks.	Administrative Team is an integral part of the study as it meets regularly to discuss the implementation and provide feedback. The Director General joins the PAR process through regular updates on progress, discussions about the evidence from the cycles of inquiry, and a written report on recommendations at the end of PAR Cycle Two. Teachers will be involved in two ways: • Arabic teachers will provide support as necessary for translation. They will be considered a teaching and learning resource that will provide linguistically responsive materials. • Science and math teachers will be part of some CLE groups as the CPR team deems that the evidence and the practices are appropriate for transfer. High School Heads of Department are aware of the PAR but will not take part in the research. They will be invited to participate in two CLEs so that they are aware of how math and science teachers are using scaffolding.

cycles allows the researcher to build capacity, gather data, and make adjustments in implementation to learn and reflect from previous periods (Bryk et al., 2015). This research includes the use of a Community Learning Exchange (CLE), to engage different school members with diverse expertise and points of view to be part of the sharing and learning process. The CLE will engage in specific focus group activities and discuss their language beliefs and practices. The CLE will give members of the school community an opportunity to come together and better understand what each believes when it comes to language learning and why. As belief systems about language are sometimes misinformed, and new research can contribute to new knowledge for teachers (Bryk et al., 2015), this reflective practice will allow members to reflect on their beliefs and practices and pinpoint which areas need to be adjusted for improved student outcomes.

The CPR group consisted of two teachers who teach math and science to 42 tenth-grade students, of whom 39 are ELLs. The other participants in the study included the administrative team members who need to be updated on data as it is collected and the department head for science. The schedule for the PAR processes is in Table 3.

Confidentiality and Ethical Considerations

Although student scores and other data were not collected for the PAR project and study, these data are important for teacher discussions. Therefore, we ensured that any student work or assessment evidence that we discussed was confidential. Making sure that participants and their data are protected was a priority for the CPR group and me. The data cannot be shared, but the general trends of the success or failure of the PAR can be described.

Table 3

PAR Schedule

PAR Schedule	Date/Cycle and Activity
PAR Cycle 1 Fall 2019 August-October	CPR will discuss the implementation of the scaffolding tools. Introduce students to the new model of translated command terms, vocabulary worksheets, and the guidelines for use of translation dictionaries. Our CPR had a first formal CLE meeting before initiating scaffolding tools. Discussed professional development needs in CLE meeting with CPR group. CPR group journaled daily outcomes and reflect on scaffolding tools.
PAR Cycle 2 Spring 2020 December 2019- February 2020	Review the data and meet with the CPR group. Request feedback from teachers on the implementation process. Discuss in detail assets and challenges and adjust for improving student outcome. Share all perspectives and data with the administrative team. Make necessary changes and discuss in CPR meeting. CPR group will journal or discuss weekly outcomes and reflect on scaffolding tools. CPR team will meet with lead researcher for member checks. Share recommendations with the administrative team.

Student achievement outcomes constitute an area of ethical consideration because they may not improve during the process of implementing these scaffolding tools for the PAR. Hao and Yazdanifard (2015) have found in their leadership and change research that with some change implementation, results are not seen immediately; in fact, sometimes the change brings no results at all. With our student data we are keeping a set of evidence about classroom observations to ensure that our practices are not harmful or stagnate learning. The goal of the participatory action research (PAR) is to implement change that will have great impact on student learning. Because it is a change project, it is under scrutiny and requires that we maintain confidentiality of the conversations with teachers and administrative team.

The impact question was discussed in detail, and we used the current research and field practices to weigh both the benefits and potentially undesirable outcomes. While we can never guarantee what might happen when we are in the process of action research, we were able to conclude that we would not affect students adversely. A detailed discussion of confidentiality and ethics is in Chapter 4.

Study Limitations

The areas of limitation are transferability and dependability. Transferability of the PAR is possible but not likely given the context of the school in which about 90% of students are dual language learners and 50% of the teachers speak Arabic. Many students used the necessary scaffolding techniques in their classes without support from others. Dependability is also an area of limitation because of the full reliability of the results. The findings are consistent, and the study could be repeated using the participatory action research methodology. However, all languages are different and dependent to some degree on the connection between the first and second language. While the PAR is transferable within the school community as the design could

be used with different grade groups or divisions, it is less likely to be used out of our context without significant adjustments. A detailed analysis of the study limitations is in Chapter 4.

Chapter Summary

An inclusive environment is the right of every learner, including ELLs. In the PAR, we examined a persistent issue in our instruction of science and math with second language learners. We wanted to understand if we could create better scaffolding systems that supported students to not only learn the second language but also to use the first language as a supporting tool. As a society and school system, we need to stop perceiving second language learners as "low functioning" and assuming that the first language is a barrier or hindrance instead of an asset. If teachers are better equipped with the current research on language acquisition and scaffolding tools and supported in using the first language to learn the second language, we could create a cultural change in how the second language is both learned and perceived by educators and students. ELLs would no longer have to be excluded from the class.

The PAR includes six additional chapters. Chapter 2 is the literature review in which I share the research on language acquisition and language learning. In Chapter 3, I delve into the school context and introduce the persons on the CPR team who implemented the PAR with me. Chapter 4 details the PAR methodology. Chapters 5 and 6 provide the results and reflections of PAR Cycles One and Two. In Chapter 7, I share the summary, discussion, and how the study contributed to learning about the benefits of using the students' first language to learn a second language.

CHAPTER 2: LITERATURE REVIEW

Scholars debate when human language began but is assumed to have started about 5000 years ago, and is considered a fundamental human function in almost all societies (Fischer & Immordino-Yang, 2008). In each new generation, a baby is capable of learning phonemes from any language in the world, but as the child learns the phonemes of his or her first language or mother tongue, the ability to learn other phonemes easily is lost (Werker & Tees, 1984). As the spoken language is learned, the alphabet is the basis of oral and written literacy (Fischer & Immordino-Yang, 2008). The letters are put together in multiple combinations to create "words" that represent specific meanings. The more literate a person is in a particular language, the more automatic decoding and reading become. Once print is recognized, the brain cannot help but read it and cannot stop at will. Language learning is relatively easy for the mother tongue language or first language, termed Language 1 (L1); for most children, the first language is learned almost automatically (Cummins, 2000; Fischer & Immordino-Yang, 2008).

Dual language acquisition is the ability to understand a second language at the same level as a first language. The task of fluency in two languages is especially complex for second language learners when encountering content with a large number of unfamiliar terms or vocabulary (Cummins, 2000). While many learners might have a strong understanding of content in the first language, they are often unable to develop or showcase content knowledge in the second. One key question for the PAR study is: Can teachers provide specific scaffolding that supports second language learners to access subject content fully so that they are not hindered from learning?

Learning a second language is more complicated unless the child is bilingual from the outset (Cummins 2000). Thus, in the PAR study, I examine specific strategies in the content

areas of math and science for ensuring student success of ELLs whose first language is Arabic. In this literature review I delve into how learners acquire a second language and the role the first language could have in supporting the learning process. Two areas of research are key to the literature review:

1. Language acquisition and how students become confident in two languages;
2. Professional development for math and science teachers that supports them to incorporate language strategies in their content curriculum.

In the first section on dual language learning, I describe L1 acquisition and differences in how the brain works when learning a second language (Cummins, 2000; Fischer & Immordino-Yang, 2008; Krashan, 2003). In the second section, I discuss the importance of language teaching in content classes. Significant achievements gaps occur if language learning is not a part of the instructional program in math and science content classes for dual language learners (Garcia, 2009; Janzen, 2008; Kim & Chang, 2010; Prochazkova, 2013). Professional development can support content area teachers in understanding the value of language learning for students in math and science classes. This section includes the role of leadership and methods for changing school cultures with regard to beliefs and practices about language learning. Leaders are responsible for shifting the culture regarding language learning to develop motivation and to create more inclusive classroom environments (Bandura, 1997; Donohoo et al., 2018).

Dual Language Learning

Students learning English as a second language are referred to as limited English proficient individuals (LEPs) or English language learners (ELLs); a student who has become completely fluent in a second language has dual language competency and is no longer

considered an ELL. The increasing number of ELLs in the American educational system forces us to pay more attention to the strategies of language learning and puts pressure on the budget, society, and teaching skills (Bleakley & Chin, 2004). Individuals having poor language proficiency in the dominant language of the country to which they have immigrated will be at a disadvantage in education and employment and may require continuous governmental support (Bleakley & Chin, 2004). The standardized content and language evaluation instruments together with the diverse cultural environments that typify the American educational landscape create a unique atmosphere for studying how to acquire a second language through and in content learning. The next part of the review focuses on how language 1 is learned, how language 2 is learned, and finally how we can incorporate language 1 when learning language 2, currently termed translanguaging. Figure 2 depicts the two sections of the literature review: dual language learning and language learning in content areas.

Learning Language 1

Increasing non-English speaking immigrants in the US are growing, and school systems must pay attention to provide them with a proper support framework. Immigration to the US from all over the world is on the rise. Thousands of immigrants find shelter in America, and more than half of immigrants only speak their mother tongue. To better understand language learners, we must first understand their first language. How children typically learn language, including the role of memory and transfer in learning a language, is a key element of the way we shaped our language scaffolding intervention.

Defining Language 1

Language 1 is the home language, the first language a child learns. The acquisition of language includes vocabulary, memory, and transfer. Fishcher and Immordino-Yang (2008)

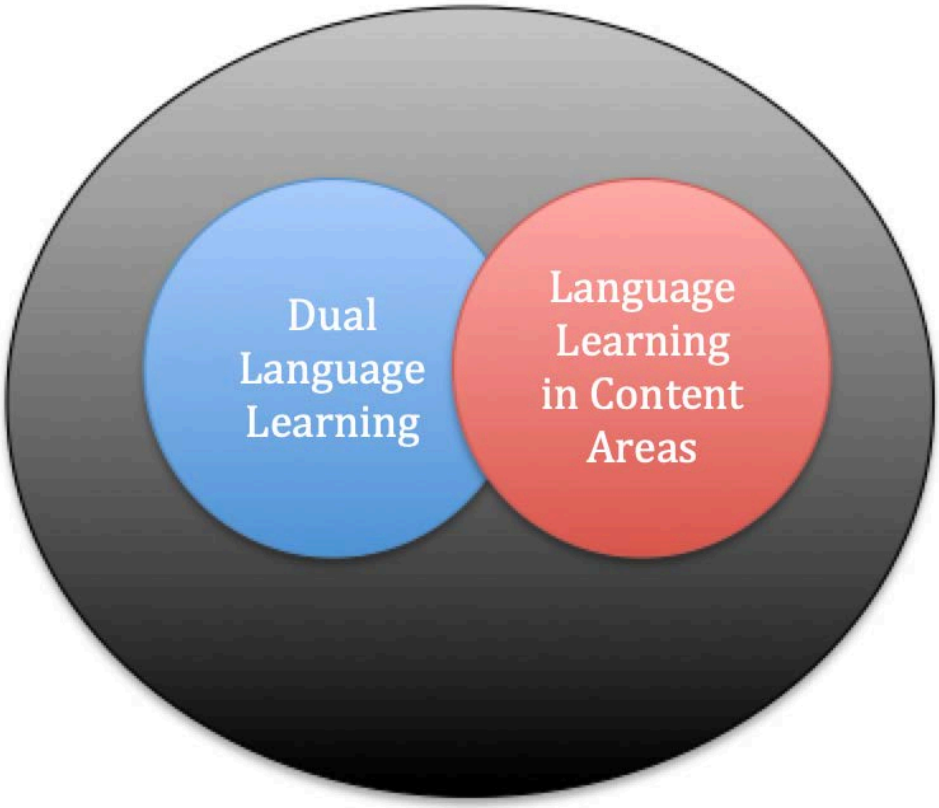


Figure 2. Literature foci: Dual language learning and language learning in content areas.

and Cummins (2000) explain that in the process of learning L1, the child acquires a set of skills and implicit metalinguistic knowledge that can later be used when learning a second language. Cummins (2000) believes that these skills and knowledge, which he terms "common underlying proficiency" (CUP), provide the basis for the acquisition of both L1 and L2. Any expansion of CUP that takes place in one language has a beneficial effect on the other language(s) as shown in Figure 3.

Typical Language Learning

Children start to learn a language to support their most basic needs (Byrnes, 2007; Vihman, 2017). The child uses its vocabulary to communicate needs such as hunger, pain, or love. The language input and then the verbal communication output require complex systems in the brain to learn and retrieve words that connect to these needs. Children model and learn language from the adults in their environment (Vihman, 2017). "The units are words, the materials are the small set of sounds from which they are constructed, and the combinations are the sentences into which they can be assembled" (Saffran et al., 2001, p. 83). As they acquire more language, children expand their vocabularies and can construct more complex sentences.

Vocabulary words, a group of facts and rules that follow the grammar of the first language, and the repeated use of the words create the foundation of communication (Wenner & Campbell, 2017). Children's vocabulary expands with the help of caretakers who talk to and teach them. The more active and conscious a caretaker is with teaching vocabulary, the more the child learns. Narrating the child's world and offering increasingly complex vocabulary builds a child's oral language.

By the time a child starts K–12 schooling, the child typically knows an average of 4,000 words; even if the child has not learned to read, s/he has increased phonemic awareness, perhaps

Figure 3. Common Underlying Proficiency Model: The underlying proficiency in language 1 (L1) supports the learning of language 2 (L2).

knows a few sight words, can recite the alphabet, and can communicate orally in full sentences (Wenner & Campbell, 2017). Some language rules and commands are innately programmed in our minds (Wenner & Campbell, 2017). Children learn many words based on their experiences with adults, and the quantity and quality of the experiences will influence the pace of vocabulary expansion (Vihman, 2017). They acquire vocabulary through rehearsal that stores the words in long-term memory and enables them easily to retrieve the words from the brain in response to needs (Cummins, 2000). Many times, the retrieval after practice becomes so easy the child develops automaticity (Fischer & Immordino-Yang, 2008).

Role of Memory and Transfer

Both remembering and transferring plays a critical role in language learning. Memory, the ability to learn, retain, and recall information (Byrnes, 2007; Fischer & Immordino-Yang, 2008), plays a crucial role in the development of language after a child's initial introduction to words. The components of memory have their particular processes that work in each element. If the child has sufficient rehearsal, the words, initially in working memory, transfer to long-term memory (Bransford & Schwarz, 1999). In addition, language learning requires the development of consciousness or metacognition. Vocabulary is an essential aspect of language learning (Byrnes, 2007). While language 1 is learned as a group of facts or rules that create the foundation for communication, including pronunciations and basic reading rules, the awareness of those rules and understanding the process of learning for teachers is critical to ensure retention.

One critical cognitive development aspect of language learning is the transfer of skills. Transfer of skills is the process of extending knowledge acquired in one context to other contexts and the transfer of language skills from one language to another (Byrnes, 2007). Children learn skills progressively and obtain mastery through practice. Transfer can be both beneficial and

detrimental (Byrnes, 2007). Transfer is beneficial when using language 1 to teach language 2 using specific scaffolding strategies so that the learner does not become dependent on translation. However, transfer can become difficult or detrimental in some cases when the first language is shunned in learning the second. Transfer is often hindered in this process because different languages are not determined in separate parts of the brain; language rules and principles transfer to the second language regardless of the classroom design.

Memory, vocabulary, and transfer are the foundation for learning a language. The first step is the vocabulary aspect of language, being able to learn words that allow you to express needs. With further development, the child is introduced to and mimics more vocabulary. Then comes the ability to store words and grammar rules in long-term memory and transfer them to different scenarios and contexts.

Learning Language 2

According to Tum (2015), nearly 5 million students in the US from pre-kindergarten to 12th grade are ELLs. The current policy in many schools and districts is to apply specific strategies for ELL language acquisition; teachers integrate all available methods for classroom instruction using extensive language supports and designing the lessons so that ELL students can get a lot of practice in reading, speaking, listening, and writing. While language strategies have an overarching system, implementation is different depending on school and level of teacher ability.

Defining Language 2

Language 2 is the second language a person starts to learn after their mother tongue. Because a first language is already in place, acquisition of language 2 becomes more complex. Transfer is more complicated when learning language 2 because the learner already has

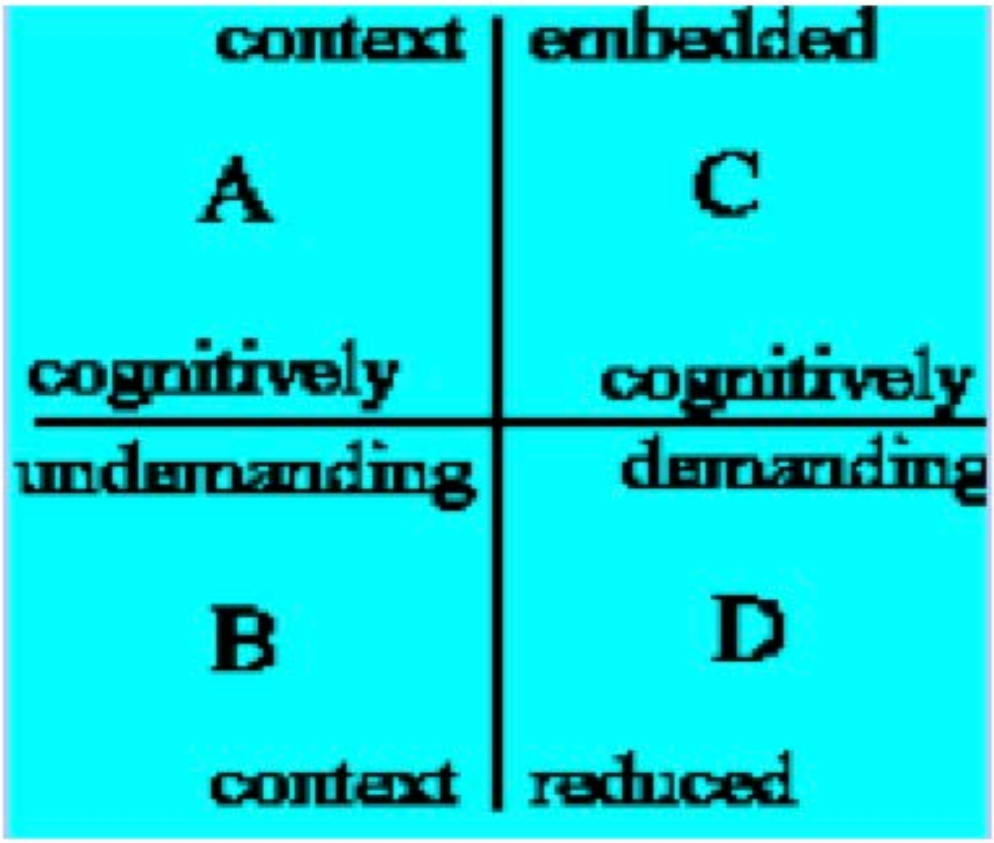
incorporated a different set of grammatical rules. If there is no mention or connection made of these differences in grammar rules, transfer is incomplete, and the child's learning of the second language is hindered. Thus, explicit transfer can only occur when the first language words and syntax are connected to the second language.

Transfer can occur more efficiently if language rules and principles about the second language are an explicit part of the classroom design (Halasa & Al-Manaseer, 2012). In their study conducted with 50 students at the University of Jordan, Halasa and Al-Manaseer found that relying on the first language to teach the second language was beneficial for 2nd-, 3rd-, and 4th-year students for whom Arabic was their mother tongue. Learning using the first language encourages learners to make those connections between the first and second language, which supports acquiring grammar rules and vocabulary in the new language (Gardner et al., 1997; Liu, 2008).

Role of Learning Theory

Learning a second language requires explicit instruction, and using the appropriate learning theory is vital to making sure it is done effectively. First, teachers must understand how learning theory supports instruction. Much like Vygotsky's (1978) zone of proximal development, the learner can only connect to the new learning if it occurs within the person's current zone of knowledge and skill. If the new learning is too advanced for that individual, the learner becomes lost; there disparity between language and content is too great, and the language learning cannot occur (Piaget & Cook, 1952). Therefore, it is imperative that we teach a language at the appropriate place in terms of content as well as skill.

Cummins (2000) devised a model (see Figure 4) that can support English language teachers to determine the difficulty of a task so that the teacher can operate within the zone of



Note. (Cummins, 2000).

Figure 4. Difficulty of task range.

proximal development of the learner. The purpose of the model is to determine the difficulty of tasks based on a continuum from less to more cognitively demanding tasks while at the same time defining the task along another continuum from context-embedded to context-reduced. By using the framework, teachers can choose which task the student can reasonably complete and provide support, such as additional visual and oral cues. For example, the teacher, in choosing a context-embedded task, can use illustrations of the topic under discussion or ask questions to confirm understanding. The opposite is a context-reduced task as in listening to a lecture or reading dense text in which there are no other sources of help than the language itself. As Cummins (2000) explains, "Clearly, a D-quadrant task, which is both cognitively demanding and context-reduced, is likely to be the most difficult for students, particularly for non-native speakers in their first years of learning English" (p. 44). Using a D-quadrant task is important for ELLs to be able to accomplish such tasks because only when we can meet the learner at their level ability will they be able to reach academic success (Cummins, 2000, p. 41).

When students are learning a new language, teachers must include proper diagnosis of learner skills so that the teacher knows the starting point for making decisions about effective strategies for learning a second language. If the learner is a beginner and the complexity of the language content is too great, the learner will become anxious and unmotivated; assessing readiness is key. Teachers must consider how specific grammar rules can complicate or facilitate learning a second language. Yuan and Zhoa (2005), in working with 50 university students who spoke Chinese and Arabic, explain how specific grammar rules found in the second language that are similar in the mother tongue are easier to learn; the role of the educator is to help learners be aware of these connections. They concluded that "[a]lthough it seems unlikely that all the features of L1 are equally susceptible to transfer or will inevitably lead to constructions

deviant from the target language, the awareness of possible L1 transfer enables L2 researchers to pay attention to the possibility that a certain construction in the learner's L2 grammar could be shaped by the prior knowledge of his L1 grammar" (p. 18). This supports the vast amount of language research done by Garcia that language 1 can be a facilitator to the second language.

In their study of 332 university students, Park (1997) identified different strategies that can facilitate learning of a second language. Building self-confidence with others learners in a language class through encouragement and group work can make a difference in both their motivation and achievement outcomes. The successful strategies included helping learners to feel comfortable speaking the language and taking risks in the classroom without fear of reprimand. Applying extrinsic motivators, such as grades and encouragement and praise from teachers, was a positive strategy to support language learning.

Group work is critical to learning a second language. In studying group work with EFL, Alfares (2017) found that most learners preferred group work and that collaboration encouraged students' motivation to learn the content. The learner's ability to use language 1 with peers when they needed extra help and support was a contributing factor. DeJesus's (2008) work suggests that learning a second language in mixed groups with support from peers in the class supports students; much like intersubjectivity in Vygotsky (1978), the learning from peers offers a special support that helps in learning a second language. Vygotsky studied how dual language programs close the achievement gap with learners who are learning a second language. He proposes that an immersion style of language learning supports consistency and allows for practice for dual language learning.

Finally, in their work on second language acquisition, Chamot and O'Malley (1994) distinguish between academic and social language types: cognitive academic language

proficiency (CALP) and basic interpersonal communication skills (BICS). CALP might take up to 7 years whereas BICS may develop within a 2-to-5-year period.

In summary, both knowledge of learning theory and effective instructional strategies are critical. However, some issues such as consistency, practice, appropriate transfer, peer learning, and motivation to learn the language are necessary components of effective ELL classes. The PAR project will add specific knowledge of how the peers and groups use language strategies that require teacher modeling and student practice. That specificity for the content classes of high school science and math is the focus of the study.

Using Language 1 to Learn Language 2

The use of the first language can be a successful tool in learning a second language if the proper interventions are in place. I focus first on Krashen's work on the stages of language acquisition and the importance of having a safe place to learn a language. I then delve into using the first language to support second language acquisition, and finally I discuss translanguaging, another system for using the first language to learn the second language by explicitly authorizing the importance of the mother tongue.

Language Acquisition Model

Krashen (2003) outlines a language acquisition model for the skills that must be developed for second language learning to occur. He argues that the second language can best be acquired in anxiety-free, natural situations (Krashen, 2003) and emphasizes the importance of inclusion and motivation in acquiring a second language. When English is taught as the second language, learners naturally move from novice language use to mastery; each stage requires a different strategy (Krashen, 2003). Linguists insist on active usage of the first language in mastering English as a second language, especially in early stages of the language acquisition

process. Yet, the advanced stages of language mastery should be marked by active cooperation with teachers who are either native speakers of English or who have acquired English fluency as a second language. According to Krashen (2003), at this stage usage of the first language should be minimal.

Language is acquired through a "continuum of learning," which consists of predictable stages of language skills evolution, starting from basic skills to high proficiency levels approaching that of a native speaker (Krashen, 1981). Figure 5 describes the five stages of language learning in more detail: pre-receptive, early production, speech production, intermediate production, and advanced fluency.

In summary, certain pre-learning language skills must be in place before a second language can be learned. Krashen (1981) discusses this in detail, and for some educators this is the learning acquisition model they use to better understand how they can teach a second language. A second language requires a more explicit approach for learners, and many teachers would benefit from detailed guidance on how first language scaffolding can support second language learning. Scaffolding would include placing specific interventions/support for EL learners when teaching specific content material.

Mixing First and Second Languages

In the PAR study, we intend to use the first language to support second language learning. Finding the right mix between using the first language and the second language is imperative to ensure that the use of the first language does not hinder the learning of the second language. I present the key findings from two studies that clarify how the first language can aid second language acquisition (Halasa & Al-Manaseer, 2012; Lui, 2008).

Halasa and Al-Manaseer studied new techniques in second language learning, including

Stages	Description
I	This stage is pre-receptive, which means that ELLs accumulate basic skills of grammar, speaking, writing and understanding. This period may last from several hours to several months and is frequently referred to as a "silent period". ELLs have to know at least 500 "receptive" initial words, which have to be made comprehensible for them; however, students usually do not speak during this period but are able to respond adequately to strategies involving simple actions and simple phrases. For instance, going out, opening the window, nodding, saying simple "yes/no", pointing to a picture or object. The first native language communication is very important on this stage helping the students to better explain the grammar and lexical meaning of English words.
II	This stage is defined as *Early Production* phase lasting from several months up to a year. This stage allows ELL students to use the enriched vocabulary of more than 1000 active words and speak out first simple phrases demonstrating sufficient comprehension of the learned material. The first language is important in communication in case the student fails to explain the phrase in English.
III	This stage Speech Production period takes on average one more year allowing ELL students to master 3000 words and more, use simple sentences and short phrases. The most important skill acquired during this stage is interaction ability. Students may ask the simple question "*Can you repeat please?* " or "*May I answer the question?* " and are able to give a comprehensible answer. ELLs start using longer sentences, which may contain grammar and vocabulary mistakes. The first language may intervene with the second language skills on this stage.
IV	Intermediate Proficiency marks this stage. This period lasts another year after speech evolved. ELLs master more than 6000 words starting to make complex sentences, asking complicated questions, sharing opinion and ideas. The first language might create certain difficulties on this stage provoking the so-called interference effect.
V	The Advanced Language Level is characterized by high language proficiency. Five to seven years are required to gain advanced language skills when ELLs develop sophisticated vocabulary and can take part in all classroom activities on the same level as native speakers. Using the fundamentals of language acquisition theory teachers need to accept a student's current language proficiency motivating them to pass from one stage to another. Krashen (1981, p. 102) suggests the "comprehensible input" concept, which allows ELLs acquiring language skills by "intaking" language at the level higher than the current proficiency level. The teacher is supposed to provide a linguistic and cognitive challenge on every stage of the language acquisition process in order to promote stable progress of a student. For instance, when a child is able to understand "*get your toy* " phrase, so changing it a bit with "*take MY Teddy Bear* " offers some new bits of information, providing new knowledge, which helps to master the new material. The first language is not disturbing the student on this stage whereas on this stage the language skills are adequately mastered to make communication on both languages free.

Note. (Krashan, 1981).

Figure 5. Language acquisition theory stages.

the use of the mother tongue in classroom situations. The goal of the research is to explore if reconsideration of the model that the first language should be avoided in a classroom with second language instruction. All 50 Arabic-speaking participants scored less than 65% in the English Placement test taken before entering the university and therefore were required to take an English Communication Skills class. The errors noted in the participants' first performance included the use of personal pronouns instead of or in addition to the relative pronouns, especially with prepositions. For example:

- "My mother she is a teacher, who teaches us all we need it."
- "This is the pen which the president writes with it."

The English sentences that students created were a literal translation from Arabic, and the errors were caused by negative transfer from Arabic. A detailed analysis of all 692 errors in the first test concluded that 100% were due to negative L1 transfer, that is, "an item or structure in the second language [that] manifests some degree of difference from or some degree of similarity with the equivalent item or structure in the learners first language" (Halasa & Al-Manaseer, 2012, p. 2).

The researchers then administered another test to the same participants covering the same areas. Before this test, they explained the errors and compared the sentences in Arabic to the English equivalents. The number of errors detected decreased to 140. They concluded that the explanation in L1 allowed for a better understanding of how English differed and reduced transfer errors.

In another study with 89 university students, Lui (2008) aimed to better understand the effects of L1 use on L2 vocabulary teaching. In examining how the relationship could be beneficial if used in the teaching process of the L2 in the classroom, content areas or subjects

were selected based on the students English results on the National College Entrance Examination and Pre-test. The subjects were undergraduate non-English majors in Qingdao University of Science and Technology. Chinese was the mother tongue of all participants, and English their second language. There was no apparent difference in the English ability of the participants. Two 700-word English essays were selected from New Horizon College English. Liu and his research team picked 60 words from the essays and tested the students on their meaning. The test required participants to decide if they knew the word or expression and write the corresponding Chinese meaning within 30 minutes. The teacher then explained the essay 10 minutes later, described the meaning in English, and explained each of the 60 words and expressions. The experimental group received explanations of each word in both Chinese and English. They were asked to underline the word and write the meaning in Chinese. In the control group, researchers explained the words and expressions in English only, and students were asked to underline the words but not write out the Chinese meaning.

Three weeks later, all subjects participated in a second test. Students were given 60 English sentences with one word or expression from the original 60 and were required to translate all sentences into Chinese. The research findings indicate that L1 could be used as a tool for checking and validating understanding of L2. They suggest the use of L1 to understand L2 vocabulary because the language and systems of L1 are in the mind of the learner. As discussed earlier, in the process of learning L2, connections in the brain will be made. These transfers such as translation cannot be stopped just because L1 is not discussed during the process of learning L2 in the classroom. Since both groups started at the same vocabulary level, the second test results showed that the experimental group acquired new words and expressions better than those in the control group.

Another technique is translanguaging, which values the mother tongue as an asset to learning language 2.

Translanguaging

Translanguaging theory offers a broader view of why first language use is critical in acquiring a second language. Translanguaging is different from the process of language acquisition and using first language as a tool or scaffold; translanguaging, as the prefix "trans" (*across* or *beyond*) suggests, posits that language performance of bilingual children is a process of leveraging their full language repertoire (Garcia, 2009; Wei, 2014). From this perspective, educators look at a child's linguistic performance from the student's internal perspective, from the child's use of their full language repertoire (Garcia, 2009). For example, when supporting a learner who speaks English as a second language, an educator would discuss ideas using either language the student prefers so they can more fully comprehend the content and have equitable access to language for expressing what they understand. The theory and practice support the idea that learners view their first language as an asset instead of a barrier. The view on second language learning is no longer of two buckets with each one representing a specific language and that consist of specific skills and systems but one language repertoire, one language system, with language features that interact and support each other (Garcia, 2009). The theory is relevant to our research because it is a more equitable approach to language learning and protects the first language as both a language and a cultural representation. It also places a priority on language choice.

In the discussion of language acquisition, Krashan (2003) underlined the importance of positive emotions and extensive practice in public as a key factor of success. His language acquisition table allows us to better understand the different stages for language learning. These

stages help to support language teachers to determine the best stage to use the first language and when it would be detrimental (Krashan, 2003). The current research on translanguaging by Garcia (2009) largely supports the use of L1 as a scaffolding tool to be used sparingly when teaching grammar rules, that is, to compare and contrast the L1 rules with the L2 rules.

However, in the PAR project, we want to take this theory a step further to consider how translanguaging can strengthen cultural and equity dimensions. While we are looking at how to use specific scaffolding techniques from language 1 to support the second language acquisition, we also want to consider the culture and identity of the students and how to leverage their full language repertoire so that our ELLs do not have to shun their mother tongue in the process. The PAR is not only about implementing language learning strategies but also helping teachers who teach second language learners to understand as a teacher their mental models around language in an effort to make necessary changes to their practice to best support their learners.

Language Learning in Content Areas

Language across the curriculum is an important topic as the presence of ELLs becomes the norm in many schools (Baker, 2017; Janzen, 2008). Thirty years ago, when supporting learners was usually limited to providing support in language classes, only about 6% of the school population were children of immigrants; that has now increased to 30% (Janzen, 2008). Baker (2017) explores the social support ELLs need as the fear of academic failure is higher for these learners, causing them to experience anxiety in many classes. While many teachers have ELLs in their classes, only 12.5% of these teachers have the necessary language training (Janzen, 2008). In addition, while more teachers were second language learners as students, like most teachers, they tend to teach as they were taught. As Cuban (1993) found in his analysis of teaching practices over 110 years: “Teaching practices seemed uncommonly stable at all levels

of schooling touching students of various abilities in diverse settings over many decades" (p. 2). One major finding is that high school teaching remains teacher-centered and is not likely to change.

Janzen (2008) advocates that all educators become, in some part, language teachers so that they can fully support second language learners in all classes. With the increase of ELLs, schools and teachers are facing the need to change their views about how they are supporting learners and teaching language across the curriculum (Abedi et al., 2004). Providing an inclusive approach to supporting ELLs in all classes is now considered a student's right. Math and science teachers are now a focus for the language training provided in schools that years ago was only offered to language teachers (Abedi et al., 2004; Baker, 2017). It has become abundantly clear that unless learners overcome language barriers, they will not perform to their ability in math and science classes (Abedi et al., 2004). Targeted adjustments to math and science course work, such as translation of subject-specific vocabulary and specific command terms, can improve the overall understanding of math and science content, especially during performance (Halasa & Al-Manaseer, 2012; Liu, 2008).

In this section, I first focus on the social aspects of learning in a school environment that affect student motivation and their sense of inclusivity. Then, I turn to teacher beliefs, specifically among math and science teachers. I conclude by examining how best we can support professional development for math and science teachers as they fully incorporate language strategies into their content curriculum.

Social Aspects of Learning

ELLs who do not speak the language of the community may find it difficult to stay motivated in part because a language barrier will inhibit interaction among peers in the

classroom. Supporting language learners and allowing them to incorporate their L1 allows them to be more confident and fit better in the social dynamic of the classroom. For learners to feel comfortable and want to grow academically, they need to feel included and part of the classroom community. Inclusion means that teachers need to pay attention to all types of learners and their learning needs. This aspect of the review focuses on the role that language classrooms have in creating motivation and inclusion in school environments.

Motivation

Motivation, or the will to perform in spite of obstacles, plays a crucial role in all educational settings (Byrnes, 2007). "An overview of research on motivation simply asserted that motivation affects the extent to which language learners persevere in learning, what kinds of behavior they exert, and their actual achievement" (Root, 2013, p. 3). The general concepts of motivation apply to ELLs, but they face additional considerations in motivation. One important claim of the language acquisition theory is that teachers creating a friendly and non-threatening atmosphere achieve better results in the classroom (Alizadeh, 2016; Slavin, 2013).

Gardner (1985), Byrnes (2007), and Alizadeh (2016) found that without the necessary motivation, ELLs find it hard to remain engaged. Learners become fatigued with the necessities of learning language and content at the same time, and a high degree of personal motivation is the key factor. Motivation determines how many strategies EL learners are willing to use (Root, 2013). Lack of motivation can create a problematic understanding of a student's language ability because it becomes hard to determine if reduced academic engagement is due to the lack of motivation or language (Alizadeh, 2016; Slavin, 2013).

Keeping motivation in subjects like English or Social Studies is hard enough for language learners, but more complex material in which the curricular language is different from the

mother tongue creates another obstacle. While ELLs need performance goals and seek to gain approval for their performance in class, they also may be motivated by the desire to be accepted in the social environment, including acceptance and support from peers and teachers (Byrnes, 2007). When teachers and peers speak a language in which a learner is a novice, the learner may feel inadequate and develop a unhealthy academic identity (Byrnes, 2007). Another issue arises in language classes when learners become sensitive to academic criticism or persistent correction.

Intrinsic/Extrinsic. Language learning requires intrinsic motivation on the part of the learners; however, the external environment can either be an extrinsic motivator or detrimental to student self-motivation. Equitable classrooms motivate learners to do their best (Alizadeh, 2016). Dual language learning classrooms that foster group work and the use of L1 encourage a classroom culture in which learners feel they can be accepted for who they are. When they do not have to shun or sacrifice their L1 for the sake of L2, they are more likely to engage and feel included as part of the community.

Intrinsic motivation is related to the learner's sense of well-being and identity (Ng & Ng, 2015), for example, when the learner sets a personal performance goal to learn the content, or wants to learn a language because of the satisfaction gained. Obviously, the kind of classroom culture in which the students feel accepted and supported and in which their mother tongue is encouraged as a part of the learning process is a classroom that fosters the necessary intrinsic motivation learners need.

Extrinsic motivation means from the outside and is usually connected to the outside context, such as wanting to learn a language for the sake of rewards, grades, and praise and not necessarily for the learning itself (Ng & Ng, 2015). Gardner (1985) identified, as a reason for

second language study was to be able to be more functional in a language for job promotion or language requirement such as in schools. While these are extrinsic motivators, learners understand the importance that these two factors play in their lives and success. For many learners, both are required when learning a second language, and both are important for success in an L2.

Attribution Theory. Attribution theory explains the process by which people make judgments about the causes of their own behavior. Attribution theory is important when trying to better understand success in language learning because it is a part of motivation that focuses on student's beliefs and why they fail or succeed (Burns & Rico, 2018). Learners explain their achievement by attributing it to four factors: ability, effort, task difficulty, and luck (Burns & Rico, 2018). The learner has little control over ability, the task difficulty, or luck, but more control over personal effort. Thus, in general, attributing success to effort is a more stable and consistent path for successful learning (Weiner, 1972).

Burns and Rico (2018) studied 51 adult English learners in Spain and found that learners were more successful if they linked their ability to speak English directly to effort and believed there was room for improvement with more effort. In this research, although they found that beliefs about ability were not associated with failure with the learner, a learner who believes that effort leads to improvement is more likely to succeed. However, not all learners fully possess that level of self-reflection and are more likely to give up. This is especially true of students of color in majority-white environments. Indeed, in a longitudinal study of 115 African-American students of color, Swinton et al. (2011) found that attributing success or failure to effort was not as common as attributions to ability. Thus, teachers need to encourage students to believe in their own abilities and verify that they are intelligent enough to learn.

Self-Efficacy. Bandura (1997) discussed the importance of self-efficacy, a learner's perceptions of their ability to perform a task. Self-efficacy increases as a result of working with peers one-on-one and group work. Language learning has many complex components that can determine how successful a learner will be, but, for many, self-efficacy and their beliefs about their ability can make a difference in how far or how quickly they grasp the second language (Chan et al., 2012). The authors found that peers play an important role; when learners see their peers succeeding and gaining specific skills, they believe they can also gain those skills. Learners are often less anxious in a peer environment because learners feel open to talk to peers and learn from them. During the research by Chan et al. (2012), students thought they understood the explanation better when it came from peers, as students believed that teaching and helping others made them better at understanding the work. L2 learners are more confident speaking to a peer than to a teacher. This is why group work can be so powerful when learning a second language.

Alfares (2017) examined the value of group work and how it can play a role in motivating second language learners. The research concluded that the majority of learners wanted to work in groups and get help from peers. Some learners felt uncomfortable to ask questions to teachers of what they did not understand and were more comfortable with peers as the mistakes they made did not seem as serious. Many of the learners suggested that they were more motivated to do the work when in groups that speak the same mother tongue because if an ambiguity about content cannot be answered, the learner can always question another in the mother tongue. The mother tongue is still available with peers as a life jacket if the learners are unable to comprehend the task. The availability of L1 is a natural consequence of group work, improving the classroom environment and in turn stimulating motivation (Alfares, 2017). Next, I discuss the value of inclusion as a strategy to increase equity for language learning.

Inclusion

Inclusion in classrooms occurs when students who have differentiated needs for learning are fully considered in the classroom for learning. The PAR study will explore how using L1 allows learners to preserve their mother tongue while acquiring the second language and provides a more inclusive language-learning environment. Learners obviously must be able to comprehend a language for material or content to be learned (Krashen, 1996), but that occurs with greater impact in environments that are more inclusive, including equitable access and culturally responsive teaching.

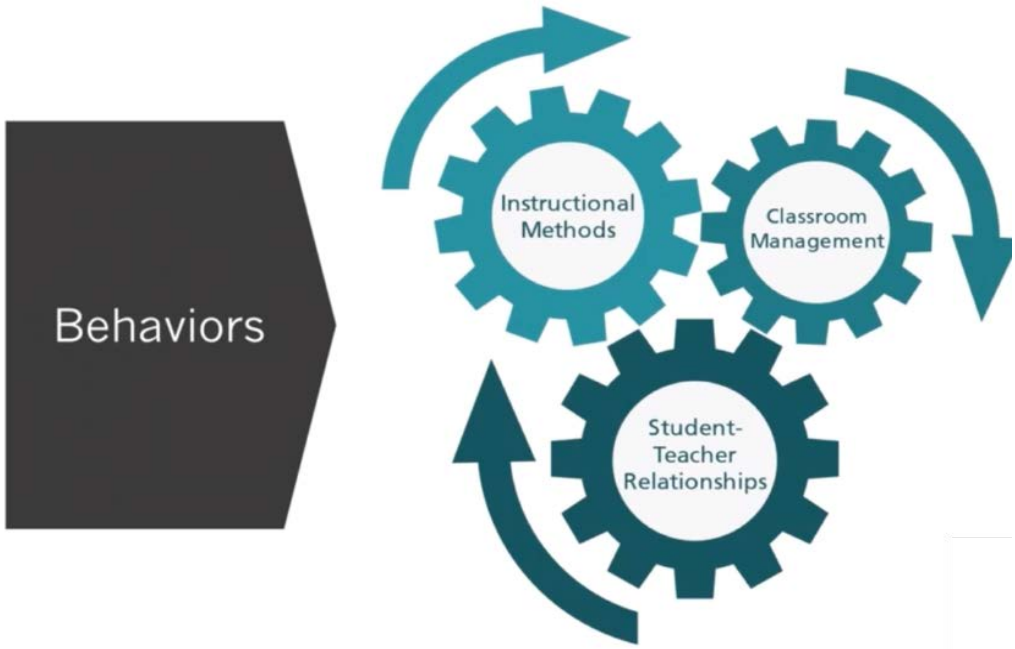
Equitable Access. EL learners often feel marginalized and excluded when there are barriers to communication. Creating an inclusive environment is not a bonus in a classroom but an obligation on all teachers and the right of all learners. A natural consequence of an inclusive environment is motivation and a more significant impact on content learning. Callahan and Shifrer (2016) found that current school policies do not afford the same course offerings to ELLs, and there continues to be a disparity between ELLs and other learners in terms of the academic exposure they are provided. This creates an opportunity gap and lack of access to certain diplomas and degrees for ELLs.

Algofaili and Elyas (2017) investigated the impact of native English-speaking teachers (NESTs) and non-native English-speaking teachers (NNESTs) on Saudi EFL university students to examine if a teacher's competence and experience played a more significant role than nationality and mother tongue when teaching EFL learners. They found that NNESTs were generally more connected to the students; students felt the NNESTs had better classroom management skills and were easier to communicate with because they shared the L1. Their research is essential when discussing an inclusive environment because perceptions of students

about teachers and how welcome they feel is necessary, that is, because when students feel better about NNESTs their performance improved

The work reinforced that of Slavin (2013) on supporting EL learners and how learners more readily accept teachers who speak the L1 because they feel those teachers can create a more inclusive environment. Although sharing the L1 is not the only way to create an inclusive environment, the more inclusive teachers are with language learning, the more motivated and less anxious learners will be. The work by Slavin (2013) and Algofaili and Elyas (2017) confirms that student performance improves when teaching faculty are supportive of the mother tongue of students.

Culturally Responsive Teaching. A culturally responsive classroom focuses on three dimensions: multicultural education, social justice education, and culturally responsive pedagogy. As the demographics change in our classrooms, culturally responsive teaching allows for an equitable approach to support all learners in the classroom. “It’s a multifaceted approach where the various parts come together to create a synergy that allows students to accelerate their own learning” (Hammond, 2014, p. 34). It is not just a strategy but a design method with its foundation rooted in equity and allows learners to become the leaders of their own learning. Teacher who use this framework move away from looking at the lack of language in a learner and more toward developing sufficient opportunities in the classroom to develop the cognitive skills and habits of mind that would prepare them to take on more advanced academic tasks no matter what is lacking. We cannot be inclusive until we change how we work with learners using different methods that support their diversity. We must find innovative practices that celebrate what our learners can do and fill in the gaps as opposed to using the lack of language as a foundation and starting at that point. As the JohnBull et al. (2013) schematic (see Figure 6)



Note. (JohnBull et al., 2013).

Figure 6. Teacher beliefs determine behaviors.

illustrates, teacher beliefs about students influence student motivation and to what students attribute their learning, and teachers' actions to provide more equitable and culturally responsive environments can contribute to increased motivation.

Teacher Beliefs: Math and Science

The goal of the PAR study is to find ways to support EL learners, specifically in math and science classes. This requires the willingness of math and science teachers to embrace language-learning strategies to support learners (Hart & Lee, 2003). To this end, math and science teachers need support to shift their beliefs about incorporating language strategies into the classroom even though language acquisition lies outside of their content area. Math and science teachers may not feel themselves capable of imparting this material; personal teaching efficacy is defined as the teacher's own beliefs about whether they have the skills to teach, manage a classroom, and develop a relationship with students (Bandura, 1997). Out of all of the elements in the school environment, teacher self-efficacy has the most significant impact on student outcomes (JohnBull et al., 2013).

Bandura in his theory of self-efficacy asserts that learning results from an interaction among cognition, social collaboration, and the environment (Ashton & Webb, 1986; Bandura, 1997; Hargreaves & Fullan, 2012). Bandura focused on how an individual's outcome expectancy is based on a belief that specific actions and behaviors will lead to certain positive outcomes (Ashton & Webb, 1986; Bandura, 1997). Strong teacher efficacy does not change based on the diversity of learners, no matter who is in the class; the teacher's self-confidence in his or her ability to support students is the key factor in learning. I discuss the importance of teachers feeling confident to take on language in content areas and how individual and group self-efficacy among teachers bolsters teacher beliefs.

Teaching Language Across the Curriculum.

Teachers need to increase their ability and sense of efficacy in including language learning as a part of all content teaching. Teaching language across the curriculum is more popular as a common catchphrase in many schools, but math and science teachers rarely get the support that language teachers receive. As an administrator in different language schools for several years, I have found that many science and math teachers struggle with including language strategies in their content. As a result, they develop a sense of anxiety, and their lack of self-efficacy influences their ability to change practices.

The CPR group members are both bilingual teachers who speak English as a second language. To provide the best support for them, I needed to overcome their anxieties about taking on language teaching in a classroom environment, including building what Bandura (1997) calls each teacher's belief that they have the skills to teach. The teachers understand the challenges of teaching, are culturally responsive in many ways because they share the same mother tongue, Arabic, and have experienced using L1 to learn L2 in their own learning experiences. However, they do not fully understand the newer theories about language learning like translanguaging and believe that their role is to communicate in English so that the learners will be prepared academically for upper levels of high school and college. In discussing individual and collective teacher efficacy, I am interested in how best to support content teachers to become more effective language teachers.

Individual Teacher Efficacy

Professional learning support for teachers will uncover their beliefs about themselves as language teachers in content courses, including their understanding of individual and collective efficacy as well as their implicit biases about teaching language. Sources of teacher efficacy

include master experience, vicarious experience, verbal persuasion, and physiological responses to context (Bandura, 1997; Goddard, 2002; Hargreaves & Fullan, 2012). Master experience is having experienced a situation and using that experience to respond; a vicarious experience is observing and seeing what success looks like (JohnBull et al., 2013). Verbal persuasion is using comments from others to act; negative or positive physiological feelings that the teacher has in the teaching context influence their ability to act. In addition, teachers' unconscious biases about language learning, often based on inaccurate sources, may influence their willingness to try new methods. When leaders provide professional development, we must consider implicit beliefs that influence our behaviors and in turn play a role in what the teacher is going to teach, their classroom management choices, and how they develop student-teacher relationships (Johnbull et al., 2013). Providing professional development to teachers in the areas of new research about best practices for language acquisition is important, but to ensure changes in practice they must better understand their beliefs and the source of their choices—mastery, vicarious experience, verbal persuasion, or physiological or emotional feelings—and reflect on their practices.

Collective Teacher Efficacy

Collective efficacy can be defined as "a group's shared belief in its capability to organize a course of action to produce a level of attainment" (Bandura, 1997, p. 477). The belief that teachers develop in conversations—informal or in professional learning situations—are the most powerful element in determining the extent to which they are willing to change. Leadership can play an important role in building collective efficacy with teachers by structuring conversations about evidence and learning results that support efficacious feelings in teachers (Donohoo et al., 2018). "When instructional improvement efforts result in improved student outcomes that are validated through sources of student learning data, educators' collective efficacy is strengthened"

(Donohoo et al., 2018, p. 40). The more positive impact that is noted with learners, the more it reinforces proactive collective behavior by teachers and educators. However, this requires that leaders choose diverse types of evidence that are predictive of student success.

Supporting science and math teachers to feel more comfortable in their ability to use language skills in the classes requires that the teachers feel more comfortable and motivated to want to continue to use language skills; however, the sense of mastery in this area is not strong. Thus, a key for success in the PAR project and study requires that we collect and analyze different types of data on student achievement, including assignments, tests, portfolios, and other indicators. In addition, observational data from the classroom that supports teacher efficacy to change practice could be useful. The key is making the link between teachers' actions and student outcomes explicit so that teachers understand that the factors connected to student progress are within their collective sphere of influence (Donohoo et al., 2018). Leaders can be intentional in promoting and rewarding behavior that positively influences teachers' collective efficacy by engaging conversations with teachers about their ability to become language as well as content teachers.

ELL in Math and Science

Many teachers have a misunderstanding that language support is not needed to improve math skills because students are speaking the language of numbers (Janzen, 2008). Language is a critical aspect of math teaching since most of it is taught through oral communication in a specific language (Ball & Lacey, 2012; Prochazkova, 2013). Math language is not the language of everyday life, which makes it more difficult because learners do not see the subject-specific vocabulary around them all the time. As Cummins (2000) states:

> Conceptual knowledge developed in one language helps to make input in the other language comprehensible. If a child already understands the concepts of "justice" or "honesty" in her own language, all she has to do is acquire the label for these terms in English. She has a far more difficult task, however, if she has to acquire both the label and the concept in her second language. This is why using the mother tongue to support big concepts strengthens a learner's understanding in the second language (p. 45).

Next, I examine which language strategies might be best for math and science classes.

Language Strategies in Math Classes

Cummins (2000), Janzen (2008), and Prochazkova (2013) emphasize the importance of math teachers having a mastery of techniques that can assist students in connecting everyday language with the language of math. Janzen (2008) includes these key strategies: using familiar language to understand the works and explicitly instructing students to meanings of cognates. Bilingual teachers who speak the same language as the learners can use the first language to translate confusing terms and words that are conceptually abstract. Bilingual peers in the class can support learners with subject-specific vocabulary (Prochazkova, 2013). Another strategy to support EL learners in math is to allow these learners to solve problems in small groups and clarify the meaning of words, question critical elements of the problem, summarize the purpose of the exercise, and collectively find the solution (Janzen, 2008). An additional sociocultural strategy for supporting EL learners in math classes is not requiring them to speak in English at all times (Garcia, 2009). In this way, the teacher demonstrates that she values the learner's first language and culture and creates a more comfortable environment in the classroom.

Kim and Chang (2010) explored the effects of computer games on student achievement. Their study examined math achievement of grade 4 learners with a focus on gender and language

minority groups. They concluded that male students who spoke English as a second language demonstrated higher math performance scores. There were higher cognitive gains and academic achievement with ELL learners and computer games. While there is no clear consensus of computer games and their effects on academic achievement, this study and some others have noted a definite increase in math scores when games are involved.

Kim and Chang (2010) promote the use of computers to play games that allow for content learning because computers foster a feeling of assistance among learners with limited language ability. In addition, the use of computer games provided an enjoyable atmosphere leading to more engagement. The games created a more comfortable and inclusive environment for the ELLs and allowed them to associate with other learners despite their limited English ability. Their study supports the use of a language learning system that treats the first language as an asset rather than a barrier. This strategy decreases learners' anxiety when they cannot access the curriculum and thus supports their motivation and self-efficacy as learners. This study concluded that first language, when used in the classroom or perceived as an asset, can support EL learners in math.

Language Strategies in Science Classes

Science is another content area in which EL learners struggle with language barriers. However, unlike in math, science teachers are less likely to underestimate language barriers because science requires a strong knowledge of language to grasp the material (Lee, 2005; Tan, 2011). For many EL learners, science-specific vocabulary and writing requirements are areas of struggle. Use of L1 can provide support with learning scientific vocabulary; however, L1 is not as great support for the writing required in science (Cummins, 2000). Yet, specific language writing strategies can be employed in science classes to support EL learners (Lee, 2005). In

language classes, many teachers create flexible tasks for each group to make sure they are reaching each learner at their appropriate level; science teachers need to take this same approach in writing requirements (Lee, 2005). Tasks like lab reports can be differentiated with visuals and diagrams for EL learners to meet them at their language ability level. For years, these language differentiation techniques were only required in language-specific classes and not in science, which hindered many EL science learners. Wang and Garigliano (1995) argued that lack of transfer and poor vocabulary can hinder learners in non-language classes. The translation of task directions is essential to support EL learners in science classes because they allow for learners to overcome the basic requirements of understanding what the required assignment expectations are and put more emphasis on content learning. Group work and allowing for L1 use among peers is another supportive method.

Schools may not push language support in science classes because of a common misconception that learners automatically will transfer reading and writing skills acquired in language classes to their science classes (Hart & Lee, 2003; Wang & Garigliano, 1995). Yet, EL learners are supposed to transfer specific science content information in one language to science content in a second language that they have not yet mastered. Some EL concepts learned have broad-based effects and can transfer across disciplines. While transfer can be extremely beneficial to gaining knowledge in specific subjects, initial learning of the original subject must be adequate (Wang & Garigliano, 1995). Wang and Garigliano in their 1995 study explain that supporting an EL learner in English does not transfer to learning science content. The transfer is only possible if knowledge and content are understood and gained from the start. Thus, using L1 systematically to scaffold for L2 in science content could mean stronger language development and more complete science content learning.

Another important reason for the struggle of EL learners in science is the belief that some science teachers have that their role is not to teach or support language (Hart & Lee, 2003). Hart and Lee (2003) in a study of 53 third- and fourth-grade teachers at six elementary schools found that, after extensive professional development support, the teachers were able to incorporate language into their science lessons. Hart and Lee concluded that providing the necessary support helped teachers find the right strategies for their EL learners, and language learning became a priority in their classes. But this type of support for teachers, particularly at the secondary level, is rare.

Tan (2011) in her policy research work in Malaysia explored the beliefs of math, science, and language teachers and the influence of these beliefs and mental models on their pedagogical practices. She found that teachers' beliefs about their respective roles as only content teachers or only language teachers limit students' language learning opportunities. She concluded that curricular requirements, exam pressure, and time constraints shaped classroom interactions and had implications for student learning as well. The findings reveal the lack of collaboration between content and language teachers, and the need for sustained professional development concerning content and language integration for both groups of teachers. Her work supports our belief that math and science teachers must believe that language-learning techniques in their content area are necessary if we expect learners to be successful in their classes taught in the second language. In conclusion, math and science teachers require the proper language acquisition skills to be successful language and content teachers. This is vital if ELLs are to succeed in their classes.

Teachers in Supporting Roles: Teacher Professional Learning

In many schools, language professional development is rarely available to science and math teachers although they would benefit from mentors who can support them with specific learners (Hart & Lee, 2003; Tan, 2011). Finding the right support programs is vital to helping math and science teachers achieve success in classrooms with EL learners. One idea is to have language teachers take on the role of teacher leaders to support math and science teachers. As I examine the literature on teacher leaders, I focus on how teachers can lead professional development and the importance of having hybrid teaching leadership roles for language professional development. I focus on language teachers providing instructional leadership to math and science teachers to specifically support language learning.

Teacher Leaders

Supporting math and science teachers to become more successful when working with EL learners requires the right type of professional development (Tan, 2011). Wenner and Campbell (2017) defined teacher leaders who provide professional development as specialists who manage K–12 classroom teaching duties as well as responsibilities outside of the educational site. At the same time, the leadership helps to support teachers to be better language teachers, especially when they are uniquely positioned as team-players, creators, and collaborators who have an opportunity to model content-related instructional practices. Grubb and Tredway (2010), in a meta-analysis of multiple studies about teacher leadership and school improvement, urged teachers and school leaders to work "from the inside out" so that they could co-design professional learning to support the specific needs of their context. As such teacher leaders can assume hybrid roles.

Margolis (2012) elaborated the concept of hybrid teacher leadership as a teacher who educates K–12 individuals and then assumes a role in leading other teachers in such capacities. This could be a teacher who has specialized techniques and would become a different role in the school context, not only teaching but also leading some teachers and providing coaching support (Margolis, 2012). Moreover, the opportunity that teachers can become leaders inside the classroom while at the same time do not have the opportunity or capacity to be leaders in the school at large (Muijs & Harris, 2003). Thus, the ability for schools to offer teacher leadership to increase capacity of content teachers in EL classrooms supports local expertise that can have persuasive powers to increase teacher efficacy. Language teachers have knowledge of language ability with the learners in their school and can support math and science teachers with specific techniques relevant to that school and its learners. Long et al. (2015) argued that the teaching profession is uniquely positioned to stimulate the transformation of teacher-student cooperation and to lead and change schools through the improved collaboration, best practices, and a loyal attitude.

Instructional Leadership

However, the ability of teacher leaders to assume instructional leadership roles is a key factor in ensuring that teachers incorporate research-based practices in their pedagogical approaches (Grubb & Tredway, 2010). Currently, the vagueness of the definition of teacher leadership does not always allow assigning a certain role to a teacher, but redefined this meaning and can mean that a current teacher in the building has more local knowledge in their school context and the ability to enlist local expertise in addressing the school needs.

Ball and Lacey (2012) analyzed several types of instructional leadership (administrator, principal, mentor, and the teacher); these leader types have different capacities to engender

change in schools due to the variety of their duties and responsibilities within the learning process. Additionally, Margolis (2012) found that teacher leaders had success supporting teachers in their school communities because peers listen to peers. Teacher leaders are successful in implementing professional development with greater impact for three reasons. They are working with learners first hand and have expertise in practice. Second, teacher leaders engage other teachers in a collective sense of accountability, which in turn allows for more creativity. Third, many teachers consider leadership to be a challenge for many teachers, and many teachers, when given the opportunity, rise to that challenge (Wenner & Campbell, 2017).

Teachers who are looking for ways to grow professionally and develop their skills can fit into the teacher leader role. Johnson (2015) claim that it is highly likely that teachers would engage more willingly if there were professional challenges, opportunities for personal growth, and career progress. Stagnant growth and vague career paths often demotivate teachers and cause them to leave the profession. In many cases, the teacher leader who provides professional development prefers to stay with students in the classrooms. According to Wenner and Campbell (2017), leadership opportunities for teachers can reduce attrition because when teachers can proceed with their classroom work while developing their leadership responsibilities, they are more likely to remain. Considering the disciplinary context, teacher leaders who support teachers to be better language educators can influence and reform teaching practices.

York-Barr and Duke (2004) conducted research in which three different teachers (administrators and mentors) with formally designated leadership roles led science and math classes. At the same time, several informal leader teachers taught language. They explored the empirical evidence on whether or not the leadership quality of a teacher can be conceptualized and/or treated differently across disciplines at schools. They concluded that while tensions

among teachers may affect the ways they develop, treat each other, work, collaborate, and educate within one school, learning in this micro school climate has more chance of success for developing teacher leaders and impacting teacher practice.

Conclusion

The literature review focused on three areas that set the stage for the participatory action research in which I was engaged: the role of L1 when teaching L2; how specific content teachers including math and science can support EL learners; and how schools can support these specific content teachers to include the role of motivation and inclusion when learning an L2. Content teachers need professional learning in language strategies, and they need models of best practices with the possible option of their peers as teacher leaders supporting professional development for them. When teachers start to change their perceptions on language learning and provide the necessary support to EL learners by creating an inclusive environment, they can create classrooms of motivated learners.

As a language teacher and Head of Middle Years Programme, I supported the CPR group of math and science teachers to build their individual and collective self-efficacy in incorporating language strategies in their classrooms. The support started with discussions about our beliefs around language learners, how language ability can be both an asset and a barrier when learning specific content, and how the role of science and math teachers has changed in the last 30 years to incorporate language. I shared the research on how to best use L1 to support L2.

The purpose of the PAR study was to investigate when and how the first language was used to support the learning of a second language. Implementing and using specific strategies that support dual language learners and providing the right support systems for math and science teachers will answer this question. Chapter 3 describes the context for the research, a dual

language school that aims to foster a mother tongue with all learners acquiring a second language.

CHAPTER 3: CONTEXT

Many schools are moving away from a bilingual approach, which encourages the learning of the second language as the primary objective. However, that choice often comes at the expense of the retaining and using the mother tongue (Garcia, 2009). As indicated in Chapter 2, a dual language approach allows for both languages to be intact. By using the first language to support the second language, a dual language approach maintains students' connections to their heritage and culture through their mother tongue. By combining the two, students can more effectively learn another language in the process (Garcia, 2009). Obviously, not speaking English as a first language in U.S. schools hinders students in particular subject areas. In subjects that have a large amount of discipline-specific vocabulary, students still weak in English will not grasp the material. To enhance both learning in more complex content areas such as science and math as well as language proficiency, dual language schools employ methods that support in-depth academic proficiency in both languages. The problem I address is how all teachers can use appropriate practice techniques for instruction in math and science, especially the use of student's first language to support second language learning. The premise of the project supports this dual purpose of teaching—creating a school culture that ensures that all teachers are not only teachers of content but also of language.

This chapter describes the place where the study took place, the people involved, the equity assets and challenges, and a discussion of my role. In addition, I summarize the context of the school, including the curriculum, faculty, school organization, and leadership team. I describe the persons involved in the Co-Practitioner Research (CPR) group. The final section is a discussion of my role, including how I supported the CPR group, designed the PAR, and shared the evidence as needed.

Place and People

Academic Bridge Program* (ABP) is located near Washington, DC in Virginia, a metropolitan area often referred to as the DMV (DC, Maryland and Virginia). The school is a private IB World School that caters to Muslim students. About 70% of the student body is from the GCC, and about 30% come from other Muslim-majority countries. Next, I describe the purpose of the organization, including the IB curriculum and current practices and the school organization. Finally, I describe the school leadership, faculty, and CPR group.

Purposes and Organization of School

The goal of the school is to provide Muslim students in the DMV area a private school that delivers high academic standards along with Islamic Studies and the Arabic language. Arabic and Islamic Studies classes are electives in the American curriculum. I discuss the IB curriculum, current dual language practices, and the school organization.

ABP offers a K through 12 curriculum based on the International Baccalaureate Common Core standards for Elementary (K–5), STEM Elements, Next Generation Science Standards, and project-based learning. The IB and AdvancED are the accreditation authorities for the school. To further support the implementation of these programs, learning communities in the school are arranged to promote engaged students and teachers. During the school year MAP and WIDA assessments are used to monitor student growth from Grades 2–11. Official IB Diploma examinations are scheduled in May for all seniors. The school follows the Virginia Department of Education system with regard to grading, credit, and general policies. Aligning with the State practices creates a smooth transition in cases of transfer between students from ABP and other public schools in the area.

ABP is a dual language school, and its ultimate goal is to ensure that Arabic and English are primary languages for all students. Classes are designed to keep both languages intact. For the non-Arabic speaking students, the school provides Arabic instruction and offers smaller student-teacher ratios to support student fluency among native Arabic speakers. Ninety percent of the students from grades K–12 speak Arabic as a mother tongue. Eighty percent of the students studying attend ABP because their parents are either working or studying in the US. The other 20% of the population are children of ABP employees; about 10% are from different communities in the DMV area.

The school is divided into three sections: Elementary, Middle Years Programme, and the Diploma Programme. The elementary school has its own entrance, and students rarely move from the elementary school to the main building. The MYP program consists of Grades 6–10. The taught, written, and assessed curriculum follows IB standards. The DP section is Grades 11 and 12. In the DP, all students are in the IB curriculum, and students make a final decision about whether they want to pursue a full diploma. They can opt out of the full DP and test for certificates only in specific classes. This option is provided because the school has students who enter in Grades 11 or 12 and are unable to complete the core IB requirements due to limited language ability or because their parent's school or job contract limits their time in the school. The research and action plan followed the Grade 10 students in the MYP.

The school has undergone significant changes in the last three years. The administrative team understands the staff's feelings and works hard to create a positive culture. The school does not have a district office but follows the public school system regarding curriculum framework, calendar, shared professional development, grading guidelines, and general policies. The school is IB-accredited and follows IB guidelines in how units should be created, taught, and assessed.

The Board of Directors takes an active role to make sure the school is providing opportunities for the international students to get into university so that when the parents are ready to leave the US, the students can easily transfer to a school or university in their home country.

Persons at the ABP

The people at the school were critical organizational actors in the PAR. Some had limited involvement or knowledge. However, others were interested in the PAR and provided some input and leadership. I describe the senior leadership, the faculty, and the co-practitioner researchers.

The school's senior leadership consists of a Director General, Assistant Principal, Vice Principal, and Director of Education. The Director-General works with the Board of Directors and the Embassy. The Director General speaks fluent Arabic and knows the larger ABP community. Each subject group has a department chair, and Grades 6–10 have an MYP coordinator; Grades 11 and 12 have a DP coordinator who monitors the school's adherence to the IB program.

The school has an internationally diverse teaching faculty with about half being Arabic speakers. Tuition is around $15,000 a year; ABP employees get a discount. In the last 35 years, the school has a good record on college admissions, and many of its students have graduated from university in the US or in their home countries. The school has developed robust systems and, having worked in the school 9 years ago, I could see the positive changes that have occurred. The school generally has minimal issues with regard to behavior, poor academic achievement, or social issues. The cohorts for each grade level are small with approximately 50 per grade level in Grades 6–12. Bullying and misbehavior matters are dealt with quickly, and the school is in its Tier 1 stage of PBIS implementation.

We carried out the research with teachers who taught Grade 10 students in math and science. The goal was to understand how the use of first language in certain aspects of the instruction can be a scaffolding tool to lift barriers in learning math and science. We engaged the math and science departments in the school to find ways to support their learners who are English as second language learners to understand the content. Next, I provide an overview of the Grade 10 curriculum and faculty and introduce the Co-Practitioner Research Group (CPR).

The 10th grade math curriculum is geometry, and chemistry is the science. Students who have already taken geometry in Grade 9 are offered the opportunity to take Algebra II in Grade 10. No alternative science class is offered to Grade 10 students. The curriculum is designed using the IB MYP framework and uses Next Generation Science standards. The math department uses the Common Core standards.

The CPR group included two teachers and interviews with administrators. However, I worked most closely with two teachers in Grade 10. They both are native Arabic speakers and have excellent English skills. Both geometry and chemistry require knowledge of subject-specific vocabulary to understand the concepts and ideas that are being taught. The CPR group voiced concerns about some of the students who came directly from abroad; they do not have a grounding in English vocabulary in chemistry or geometry although they are aware of these terms in Arabic. While they did not understand what was going on in English during some lessons, when specific words were translated, the students could respond to questions and understand the concepts.

Next, I introduce the teachers who are in the CPR group, including their backgrounds, current understandings, and ideas about dual language learning. Also, I discuss the interactions I

had with the teachers in my role as curriculum coach and analyze findings from our three journey lines of language learning.

Ms. Math Teacher A

The math teacher has been at the school for 9 years. She teaches Grade 10 math. Her mother tongue is Arabic, and she has excellent English skills. She graduated from a university overseas, but all curriculum and coursework were in English. She is an advocate for providing work in Arabic to students who are unable to speak English. She has a strong belief in this strategy; however, during one conversation, she was reminded that the goal is to only use Arabic as a scaffolding tool. The entire lesson could not be in Arabic as this could become a barrier for the students to learn English.

I have supported her in her Middle Years Programme (MYP) planning. As a leader in the department, she wanted to make sure she understands the program so she can monitor that her teachers were doing it correctly. Several times, she had been willing to redo work to conform to IB standards and encouraged the same of the teachers in her department. We had several discussions about moving away from only quizzes and tests as assessments for math. The yearly goal for her department was to create a more hands-on approach when teaching math and provide real-world connections.

Ms. Science Teacher B

The science teacher has been in the school for 7 years. Her mother tongue is Arabic, and she speaks English and has strong reading and writing skills. Her speaking skills are strong, but she has mentioned that people do not always understand her because of her accent. She teaches chemistry, and a group of Grade 10 boys had minimal English ability. We spoke extensively over the summer prior to starting the research and throughout the project about ways to scaffold

and provide them with the necessary support to allow them to be successful. She has shied away from using Arabic in the classroom to support the students. For the last several years, the department had a policy that teachers were not allowed to use Arabic in classes. Chemistry could only be taught and assessed in English to prepare students for IB Chemistry.

Initially, she felt less comfortable about using Arabic in the class. She felt that it would be a crutch for the students and wanted to stay away from it. She shared her concern about her students' lack of English ability and worked hard to differentiate; yet she still felt at the outset of the PAR that using Arabic is not the solution. I had worked with her as well for several months to perfect her unit planning and gain a better understanding of the MYP curriculum. She had students read at home so their parents could help translate the material if necessary. While she was cooperative and appreciated research, she was somewhat anxious and wanted to observe how the math teacher incorporated the first language when teaching in the second language. She wanted me to be in her classes to assess when the scaffolding approach would be useful. I worked with her most on planning her units. She was focused on making sure her unit planners were completed and requested several checks throughout the process.

In summary, the faculty of the school is diverse in many different ways. They are interested in and supportive of changes that could help the students improve. The faculty encourage learning a second language but also maintaining the mother tongue.

When introduced to the FoP and the PAR process, both teachers were willing to work with me. The math teacher felt she was already doing some of the language interventions but was not monitoring or collecting data. She stated she was translating as needed to support her students and did not look for information or research about it. She said that it just made sense to do this. The chemistry teacher was willing to work with me but was more hesitant. She wanted to

make sure everything we were doing was approved by the administration and would not hurt the students. She wanted as much feedback as possible with the implementation to make sure she did not do anything wrong. As both teachers indicated, they are committed to making sure they serve all students.

Equity Challenges and Assets

The issue of equity in language learning is personal for me. Having grown up with two languages before moving to the US and attempting to learn English in elementary school, I always felt that my first languages were seen as barriers. I was excluded from certain classes and considered behind my English-speaking peers in academic knowledge. I know firsthand that the more we exclude learners, the more they struggle**.**

One significant equity dilemma is providing English as second language learners with the necessary support so that the classroom environment can be inclusive; indeed, if we pay attention to the socio-cultural context of student learning, we know that working from students' assets in language and culture supports learning (Gutiérrez, 2016). Language support is usually given to students inside language classes, but students in math and science classes continue to have an achievement gap due to language barriers. The lack of inclusion creates a culture in which the students are often categorized as "low achieving" while others who speak English more proficiently are the "high achieving" group. The judgments are based on language ability rather than subject-specific content knowledge or skills in the discipline. Finally, the sole use of English creates a culture in which specific languages are considered superior to the home language.

I decided to take on the PAR project and study because I had seen first-hand the difficulties that an exclusive environment can create for learners. In our school, a significant

asset is our international teaching community; many of the teachers are Arabic speakers who could support students without the need to hire extra teachers. However, too many educators see the mother tongue as a hindrance and impediment. Many push the idea that English is the language of the curriculum. Often, the emphasis on English comes at the cost of the mother tongue. Many teachers who learned English a second language may experience an attitude and culture toward language learning that is incongruent with their connection to culture and language.

One significant challenge was helping teachers understand that part of creating an inclusive classroom is teaching to variability and diversity. That requires more than just incorporating international-mindedness into the curriculum but developing the curriculum in a universal design that naturally includes accommodations that all can use. Creating a culture inside of the school that looks at the first language as an asset and not a hindrance could allow students to feel more confident and less ashamed about being English as second language learners. The school does not have an inclusion policy, and so many teachers are not held accountable if they fail to create an inclusive environment. Figure 7 showcases the assets of the school that include the setting, community, and resources. I hoped to draw on these assets to address the challenge.

My Role

The final section considers my role in the participatory action research (PAR) as the primary researcher. I discuss my role as in "insider" in the school and share in detail my relationship with the CPR group and how I worked to engage in the research. At the same time, I detail the limitations of that role in Chapters 1 and 4.

For the year of this research, I supported the Middle School that consisted of Grades 6–

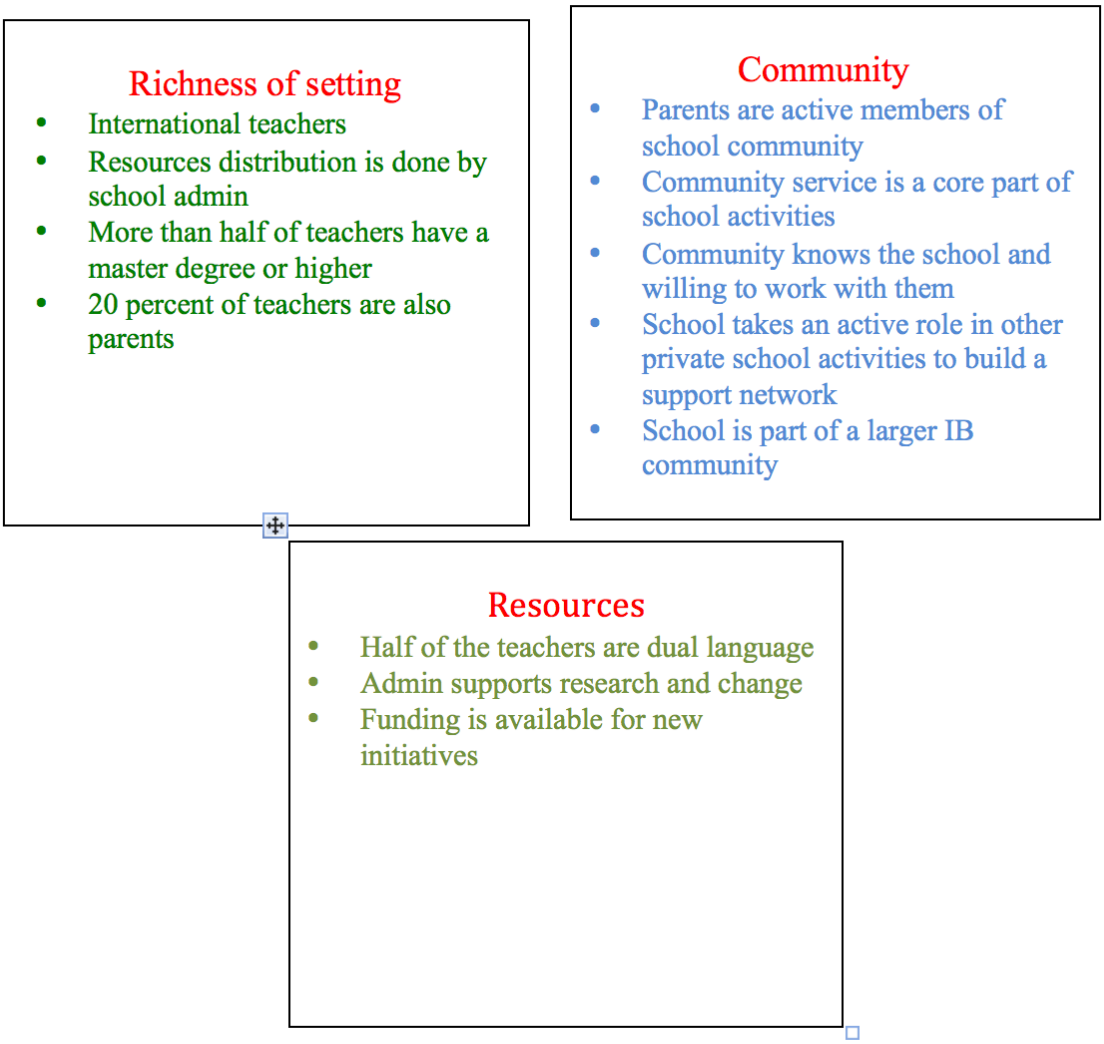


Figure 7. Assets of the school community can be used to address the challenges of language learning.

10. My job was to ensure that the written, taught, and assessed curriculum for Grades 6–10 followed the guidelines of the IB MYP. I facilitated professional development in this area, and I coached and worked with departments and individual teachers. I worked closely with students to make sure they understood the programmatic expectations. I had the majority of teachers to work with within the school. Our program was under evaluation during the research period, and the IB had requested significant changes. For the PAR project and study, I only worked with two teachers and informed the administrators. I wanted to keep the PAR small so that I could monitor the results. The school had many new initiatives, and building capacity was difficult for everyone involved. The two teachers expressed concern about their subject areas and about the students who lacked language ability. In an initial meeting when achievement data was shared, some teachers attributed the students' achievement gap in math and science to "laziness," "poor work ethic," or "possible learning disabilities." Both of the CPR teachers expressed "lack of language ability" to be the cause of the achievement gap. I picked the two teachers to work with for the duration of the PAR (one school year), and they agreed partly because they have an interest in learning more about language barriers and its role on content knowledge.

In previous school positions, I worked as both and Principal and Vice Principal, and in both jobs I had to make significant changes soon after I started. After only 3 months of arriving at the previous school, the district office wanted significant changes made to the academy. It was an adjustment for me, but I took it on because I believed not only in our faculty but in the potential of each student; I knew they could do better if given the tools. After conducting several focus groups, visiting many classes to observe, reviewing surveys, and holding one-on-one conversations, our school was able to come up with a strategic plan to help work with similar issues that we were facing at ABP.

In the ABP role, the school was required to change some significant aspects of their program due to not meeting the standards of the IB, and this has been difficult for teachers to accept. They did not appreciate a new person coming in to tell them that what they have been doing was wrong all along.

One of the primary strengths that has helped me in my leadership capacity is my ability to facilitate change. Change often equates to a loss for many and, often, when change needs to happen, many schools and teachers suffer. This feeling of both suffering and resistance can arise for different reasons, but a good leader is one who can implement change successfully despite these feelings. Moreover, a successful leader helps others navigate the feelings.

Promoting diversity is a critical component in a leadership position as well, especially working in an international school with teachers from all over the world. It is an essential element for making sure all parties feel comfortable and can create a positive learning environment for students. An international environment is automatically diverse, but the key is to ensure it is a positive environment. The diversity can have immediate benefits, but it can be a catalyst for negativity. Cultural misunderstandings and communication barriers may lead to a lack of trust and isolation.

Another major reason why the PAR is significant to me personally is that I too have experienced what many dual language learners go through when learning a new language. As both a teacher and administrator in a dual language school for the last 10 years, I have found that creating an inclusive environment when working with English as second language learners can make a difference when it comes to motivation and confidence. As an ESL student who spoke two languages before trying to learn English and was pulled out of classes for ESL support, I have seen firsthand the harm that exclusion can cause when trying to learn a new language. Until

schools build capacity and create a culture in which the primary language supports students in learning the second language, we will continue to have achievement gaps with students who speak English as a second language.

I have already built strong relationships with the CPR group. I had supported them in developing units of instruction and assessments for the IB. One member of the CPR feels the importance of a reciprocal relationship in taking on the PAR. The math teacher is working closely with me because she believes in the PAR focus of practice and believes that this is what is needed to allow students to be successful in her class. While I am not part of their inner circle in the school because I do not speak Arabic, they have both told me they trust my expertise in this area. They are familiar with my previous employment in Qatar. The Qatar organization has a reputation of being a prestigious organization in the Middle East, and many of the Middle East faculty know of it and respect it as well.

The PAR is significant because nearly all ABP students are EL learners. One of our jobs as educators is to create a safe environment that allows our students to feel comfortable with who they are and to be able to showcase their identity without fear. This identity includes being able to use their mother tongue and affirming that neither language is considered superior to the other. The next chapter details the research design for the PAR and includes the activities and timeline for how data were collected.

CHAPTER 4: RESEARCH DESIGN

The purpose of the participatory action research (PAR) was to develop different pedagogical approaches to supporting second language learning. Students are unable to be successful language learners in classes unless all teachers take part in providing language strategies to support them (Janzen, 2008). The research I shared in Chapter 2 confirmed that language learners do better with constant practice, particularly using language 1 to teach language 2. The practice of specific strategies allows for stronger long-term memory of subject-specific vocabulary in the second language (Sorenson & Paradis, 2016). During the PAR process, teachers reviewed and reflected on their practices and became more skilled at using some scaffolding techniques that support second language learners. Through analysis of teacher observations and reflective memos, we discussed the emerging evidence from the cycles of inquiry that helped us better understand specific areas on which we needed to focus and areas in their curricula that needed change.

The PAR project was designed to analyze how to support teachers to use the first language to support second language acquisition and learning specifically in math and science. Using the first language for large amounts of translation or explanation is detrimental and hinders the learning of the second language, but if used as a tool to scaffold for subject-specific vocabulary and translation of command terms, it helps learners in math and science overcome language barriers and focus more on content. I worked extensively with the Co-Practitioner Researchers (CPR) team to co-design the best methods for supporting these learners in chemistry and geometry. We used the Community Learning Exchange (CLE) approach to engage members from our school with diverse expertise and ideas to come together to share and learn from each

other. Guajardo et al. (2016) state that CLEs include time and space for everyday people to come together and have in-depth conversations to better understand and learn from each other.

I chose participatory action research as a methodology because it relies on input from the study participants—in this case, primarily the teachers. Action research is based on reflection, data, and action to improve practice (Creswell & Creswell, 2018). The best way to solve the problems in a school environment is by collaboratively working and studying to make improvements. Action research is a method for educators to reflect on their practices as a means for staff and professional development to address school-wide problems (Creswell & Guetterman, 2018). The research design was based on the value of action, inquiry, and reflection in a school.

In reflecting on the research design, I stayed away from the "Christmas tree" approach to school improvement in which school leaders continuously add new programs in an attempt to create positive school impact and make things look good in their schools. The more they add, the more decorated the school program becomes; but in the process, they cause initiative fatigue with little mastery of any of the programs implemented (Fullan, 1993; Militello et al., 2009). Instead, using PAR methodology, we examined a specific and targeted strategy for collaborative action that focused on bringing different people from the school together to engage in a cyclical inquiry process (Militello et al., 2009). To change the culture of how we worked with and supported second language learners, we needed to better understand our practices and the reasons why we designed our classes the way we did. The PAR not only provided specific scaffolding techniques but offered a place for learners to come together through CLEs and share their individual belief systems with respect to language learning and why they practiced specific techniques.

This chapter provides the research design for the PAR process, including a detailed description of the participants and the CPR group, the cycles of implementation, and data analysis methods, the role of reflection, and the limitations of the study.

Research Questions

The overarching question for the study was: How can the first language be used to scaffold second language acquisition and learning? The sub-questions that guided the participatory action research included:

- For Arabic-speaking students who are learning science and math in English, what pedagogical structures best support student learning?
- To what extent does professional development for teachers support their ability to incorporate pedagogical structures that use the first language in assessments and lesson explanation to allow students to demonstrate learning in classes that are taught in English?
- How can the work on the PAR project with a team of co-practitioner researchers change my leadership skills?

The sub-questions focused on items that were more specific and actionable. We experimented with specific techniques that required the use of language 1 to support math and science teachers to reflect on areas they felt they needed improvement with respect to language learning. We collected data that allowed us to conclude if using the first language as a scaffolding tool was beneficial to learning a second language. Through the implementation, results, and personal reflection in regular memos, I answered how the implementation of this program transformed my leadership skills. As a leader of learning in the school, implementing new programs is never easy, and building capacity can take time with teachers. I assessed my

coaching skills to better understand how the implementation not only of programs but school-wide shifts in culture are best accomplished and the leadership skills required for this type of task.

We used this operational theory of action: If teachers provide learners in math and science classes with pedagogical tools using the first language, then students will be equipped to better demonstrate their learning. This was not just a new program to change practice but an exploration of how to support educators to change personal beliefs on language learning and then enact practices that better support second language acquisition.

Research Design

The participatory action research included two iterative cycles of inquiry. The design method and timeline ensured that the researcher supported teachers to build capacity, gather data, and make adjustments in implementation to learn from and reflect on previous cycles (Bryk et al., 2015). The Plan Do Study Act (PDSA) cycle of inquiry model was useful as we planned the initial implementation and experiment with pedagogical changes. The teachers and I planned to engage students in the process to understand what their experiences in math and science classes were and then to use that information to change pedagogical tools and implement them with the students. We studied the results of those preliminary actions and made adjustments using iterative evidence. Finally, we acted more broadly and definitively once we more completely knew which tools for incorporating first language work best to address content learning in English.

Because I conducted this research with the CPR group through the two cycles as we designed, implemented, reflected, and made the necessary changes, we expected to see use of the evidence for each successive cycle. As is obvious in the implementation evidence in Chapters 5

and 6, however, while the student information would lead us to understand that key strategies were useful, teachers were reluctant to use the research-based strategies and student information to change their practices. Thus, although we used the PAR methodology, we were not always able as a team to fully use iterative evidence to inform our practices.

PAR research is designed to be a "planned, purposeful, and systematic process for collecting information, decision making, and taking action as a means of contributing to the improvement of policy to increase positive outcomes" (Militello et al., 2009, p. 24). However, the technical process of what PAR can be does not always meet the reality of teacher readiness for change. Thus, multiple factors outside of the evidence often influence a PAR process, and that is the reality of participatory action research; it is often a "messy, iterative, and generative approach that is constantly being made and remade in diverse place-based contexts" (Hunter et al., 2013, p. 26). Table 4 includes the activities I used in the PAR; the evidence from these activities answered the research question and sub-questions. We ensured that all activities and data collection were used to inform us on steps moving forward as the CPR team discussed and made decisions about changing their practices.

Co-Participant Researchers (CPR) Group and Study Participants

I chose the CPR group using purposeful sampling; the group included two teachers who teach math and science to 10th grade and myself as curriculum coordinator. The two teachers served as departments heads in the IB middle years program (Grades 6 through10) and had first-hand experience of not only teaching content areas but also teaching language development. The CPR participants taught geometry and chemistry, and they worked with the entire group of 10th grade learners who studied geometry and chemistry. Both teachers speak Arabic as a mother tongue and are fluent in English. These teachers were closest to the issue, and I determined they

Table 4

Activities, Personnel, and Timeline

Activities	Key Personnel	Timelines
	Cycle One	
• Class visits • 1:1 coaching • Community Learning Exchange (CLE)	• Lead Researcher (Curriculum Coordinator) • CPR Group (n=2) • Admin team (n=3)	August 2019-October 2019
	Cycle Two	
• Class visits • 1:1 coaching • CLE	• Lead Researcher (Curriculum Coordinator) • CPR Group • Admin team	November 2020-March 2020

were the persons who could best help with finding the solutions to the local issues of EL learning (Guajardo et al., 2016). The courses they taught required knowledge of subject-specific vocabulary to understand the concepts that are taught and assessed. Both teachers supported the research project and worked with me to answer the overarching question concerning the use of the first language as a scaffolding tool to support second language learning.

I focused on the beliefs and actions of how the teachers work with second language learners in school. Through the CLE discussions, we listened to students, changed some of our practices, and determined how much these approaches to language changed the learners' abilities to engage in math and science (Militello et al., 2009). I did not interview students; all evidence from student observations were aggregated and did not identify any students individually.

Cycles of Inquiry

The PAR cycles and implementation began in August 2019 and ended the first cycle in October 2019. The second cycle started in November 2020 and concluded in March 2020. Thirty-nine of the 42 students in Grade 10 were dual language learners. In addition, the other study participants included the members of the administrative team who needed to be updated on the progress of the research and the evidence we collected and analyzed. The updating process included sharing meeting minutes, the scaffolding tools used in the classes, and assessment scores, which were not used as evidence for the PAR process but were required by the school.

PAR Cycle One: August-October 2019

In PAR Cycle One, the CPR engaged in listening to student experiences in math and science classrooms to better understand the student experiences. Then the group discussed the implementation of scaffolding tools. We introduced students to the new model in which we used translation dictionaries, command terms, and subject-specific vocabulary that was translated into

Arabic. Our CPR had its first formal CLE meeting before initiating scaffolding tools. We discussed professional development needs with the CPR group in this CLE, and I collected artifacts. This cycle focused most on the teachers' learning and acquisition of the skills they needed to support their second language learners.

PAR Cycle Two: November 2019-March 2020

The purpose of PAR Cycle Two was to make necessary changes and continue to reflect on the process. I reviewed the artifacts from the Community Learning Exchange (CLE), reflective memos, observations, and teacher interviews and met with the CPR group before the start of PAR Cycle Two to discuss the data and patterns that we noted and to make adjustments for implementation. I requested feedback from students and teachers on the implementation process. During this cycle, we had a second Community Learning Exchange at which we discussed in detail what went well and what could be adjusted for best student outcomes. All perspectives and data were shared with the administrative team. Any necessary changes were made and discussed in the meetings with the CRP group. The CPR group continued to journal on their teaching and student learning and reflected on scaffolding tools. We came to a comfortable balance that did not create initiative fatigue but also made sure that the changes were sustainable (Fullan, 1993). We made recommendations to the administrative team to be shared with department heads and other teachers as necessary.

Data Collection and Instruments

During the PAR study, I collected data from multiple sources that allowed us to triangulate the qualitative data to fully understand how teachers implemented and students benefitted from the scaffolding techniques. The use of a variety of sources helped to ensure that

our data was consistent and that our final analysis was based on a diversity of information (see Table 4). Sources included:

- *CLE Artifacts*: In our CPR meetings and in the meetings with the administrative team, we used CLE processes. Analyzing artifacts from those meetings supported evidence-based iterative decisions. Some of the CLE meetings were focus groups that followed the Focus Group Protocol (see Appendix F).
- *Observations:* I observed classes, visited teachers three times in each cycle, and post-conferenced with teachers, using the data from those visits to analyze for evidence. The observations followed the Observation Notes Protocol (see Appendix D).
- *Meeting Notes*: I collected meeting notes from CPR and administrative meetings and from forums with faculty and students.
- *Memos.* I reflected on my practice and coaching through memos during the two cycles and developed reflective memos. (I also encouraged teachers to memo on how classes were going with the scaffolding interventions.)

Data Analysis

To prepare the qualitative data analysis, I followed specific steps. I analyzed CLE artifacts, meeting notes, class observations, and memos and developed a coding system that is consistent with research-based development of codes and open coding (Saldaña, 2016). "Coding in quantitative inquiry is most often a word or short phrase that symbolically assigns a summative, salient, essence capturing, and or evocative attribute for a portion of language-based or visual data" (Saldaña, 2016, p. 4). For classroom observations, I used coding structures developed to observe for equitable student engagement and culturally and linguistically responsive pedagogy (Tredway, 2019). I used open coding to augment those tools to address the

specifics of the pedagogical innovations we developed specifically for this project. For analysis of CLE artifacts and meeting notes, I used open coding in the first cycle of inquiry to guide the development of categories for use in subsequent cycles. The coding process allowed me to find patterns, develop categories in PAR Cycle One, and themes and findings in PAR Cycle Two that are explained in Chapters 5 and 6 in the dissertation. I shared data with the teams in all cycles and conducted member checks in PAR Cycle Two. The teachers and administrators relied on the data to determine what scaffolding techniques needed to be adjusted for the next cycle. The member checks allowed the CPR group to share in real time whether the scaffolding techniques were working, how they felt about the overall process, and whether any impact was noted in the classroom (Creswell & Creswell, 2018). In Table 5, I share the relationship of the data sources to the research questions.

Role of Reflection/Praxis

Iterative reflection is the heart of the PAR. The CPR group and I reflected during and after each cycle to understand better how everyone was experiencing the study and calibrate our expectations. Our reflections were intentional, and they required us to listen to and learn from everyone's experience; as Freire (1970) indicates, reflection to inform subsequent actions is central to *praxis.* Guajardo et al. (2016) state "[r]eflection should not be a simple 'reporting out.' Reflective practices pave the way for change—individually and organizationally" (p. 82). The PAR process consisted of not just reporting out but writing in reflective journals and memos how we felt things were coming along that we could share later in group meetings. In this way, we fully triangulated the classroom data with our observations.

Confidentiality and Ethical Considerations

Consistent with federal regulations governing research conducted with human subjects,

Table 5

Data Collection Sources to Respond to Research Questions

Research Question (sub-question)	Data Source (Metrics)	Triangulated With...
For Arabic-speaking students who are learning science and math in English, what pedagogical structures best support them in better demonstrating student learning?	CPR interviews Meeting Notes Class Observations	Memos CPR Interviews
To what extent does professional development for teachers support their ability to incorporate pedagogical structures that use Language 1 in assessments and lesson explanation to allow students to demonstrate learning in classes that are taught in English?	CLE Artifacts Meeting notes Classroom Observations	Memos CPR interviews
How can the work on the PAR project with a team of co-practitioner researchers help to transform my leadership skills?	Director and Admin input Reflection journals	Memos CPR Interviews

the PAR project was reviewed by the University and Medical Center Institutional Review Board (IRB) for final approval. I have taken all of the necessary course work and am CITI-certified (see Appendix C). The school is aware that I am working on this research to support ELLs through different scaffolding methods and to provide professional development for teachers, and I have a letter of approval (see Appendix B). Confidentiality is a crucial issue in this community, not only for parents but for students and faculty as well. I ensured that all data sources were and remain confidential. I stored all transcripts, recordings of interviews, student work samples, meeting notes, and journals in a secure, locked location, and they will be destroyed after three years. Participant names and information were protected and shared exclusively with the CPR group, faculty members in the school during professional development sessions, and the administrative team. The only purpose of sharing the names was to create learning plans for specific learners benefitting from the scaffolding techniques. We offered the scaffolding supports in this research design to all learners in the classes with no control and experimental groups. During the student meetings to discuss these new scaffolding techniques, I engaged in general conversations with all learners. I did not quote specific comments to particular students, and only aggregate quotes were collected and shared. When learners showed positive improvement with the scaffolding techniques and professional development benefitted teachers, I shared these aggregate data with the community.

One ethical consideration is the possibility that, in implementing these scaffolding tools for the PAR, student outcomes may temporarily decline. That is, our efforts might seem to have a temporary negative effect on student learning. This question had been part of many discussions in the school. However, I researched the topic and concluded that the current supports would not negatively impact their learning.

The number of hours of preparation time used for both translation and building capacity with learners to understand the system we used could be costly and time-consuming. While this could be an ethical consideration, the likelihood of this occurring is minimal. All adults who agreed to be participants in the study were eager to see how to improve the performance of students who are struggling with math and science; thus, our CPR group concluded that if the hypothesis proves to be correct, learning would improve. Of course, the possibility that a lot of teacher time and effort went into preparation and planning that yields no positive outcome would be demoralizing for the CPR group and administrative team. The CPR group was fully aware of this possible outcome and collectively decided to proceed.

Study Limitations

Lincoln and Guba (1985) offer four specific indicators of the trustworthiness of any qualitative study: credibility, transferability, dependability, and confirmability. With regard to the particular area of credibility, I feel, based on previous practice experience and research, that the findings are positive. I consulted several data sources to answer the research questions.

With regard to transferability, other language learning contexts could use this research, and the final results and overall data trends pertaining to student outcomes could be a good indication of how specific tools could support second language learners. The professional development activities featured in the PAR might transfer to other settings, but local school contexts usually determine professional development methods and plans. While this is a small study limited to one school, the processes of developing tools for translanguaging would be useful to other persons in multiple ELL contexts. Similarly, the portion of the study that focuses on my leadership development was less transferable to other school contexts due to the individual personality traits of the study participants.

In terms of dependability, how easily the research can be replicated is harder to determine. We were working with only one language, and 50% of our teachers speak that language. This is not necessarily a typical student demographic or teacher profile found in most schools. All languages are different, and depending on the connection between the first and second languages, many schools could not easily replicate the PAR. For example, in our community students were immersed in dual languages both at school and at home, which provided us with a context that could make our PAR results consistent and easily transferable to different grade groups within the school but less likely out of our context.

Confirmability is an area of limitation because of the research work with second language learners and dual language learners. The CPR group members and the researcher were dual language learners; both acknowledged a bias. Some in the CPR group already supported the idea and believed it would benefit the students before any actual data was collected. We engaged in extensive conversations with the CPR group to ensure that research and results were not viewed solely through the lens of their own biases and language beliefs.

Summary

The PAR research design included two implementation cycles. Each of the cycles consisted of design, data collection, and reflection. We analyzed data during and after the cycles, and iterative evidence provided a rationale for adjustments made to support all learners appropriately. The goals were clear: to examine how we could construct language learning differently and change the current culture of how teachers supported language learners. We accomplished our goal through a scaffolding technique of using L1 to help L2. The CPR conversations focused on how to support all teachers to support language learning and how developing this program and taking part in building capacity with these community members

expanded and changed my leadership ability. The PAR included CLE processes that provided opportunities to come together and learn from each other. Chapter 5 describes PAR Cycle One results and the iterative evidence we used to make decisions about the second cycle.

CHAPTER 5: PAR CYCLE ONE

Language learners are now a part of every school and classroom. To better support language learners, schools need to be intentional and explicit in preparing all faculty members to find the most productive strategies to engage learners. In the participatory action research (PAR) project and study we examine how teachers use first language to scaffold second language acquisition and learning. Thus, I am exploring what types of language scaffolding from the first language effectively support students to comprehend a specific lesson when they are presented in English, their second language. As a part of the project and study, I am interested in how professional development opportunities provide math and science teachers with the knowledge, skills, and dispositions for using Language 1 to teach the math and science content that is typically taught only in English. Yet, before we could explore how best to support our faculty, I realized that we needed to understand the teachers' attitudes about teaching ELLs, their rationales for why they practice the way they did, and what they believed about best practices.

In the first cycle of inquiry, we worked with the CPR group to better understand what they understood and believed about language learning and how they incorporated language into their math and science classes. The chapter consists of three sections: (1) a description of the activities carried out by the research team and the coding process; (2) an analysis that resulted in the codes used to support the initial categories; and (3) a discussion of the implications of the data for the research questions and the second cycle.

I will showcase the different activities that supported my ability to answer the overarching research question on using language 1 to scaffold language 2 learning. I review and analyze the data to evaluate for common trends and discuss in detail emerging categories in

preparation for implementation of interventions and necessary modifications for PAR Cycle Two.

Activities and Analysis Processes

In this section, I first present the range of activities I undertook to support the PAR and why. Finally, I discuss how I collected evidence and engaged in analysis. A math teacher and chemistry teacher are in the Co-Practitioner Researcher (CPR) group; I work with the administrative team members of the CPR to update them on the needs of the CPR group and what we are working on.

Key Activities

In PAR Cycle One we collected baseline evidence through conducting interviews with each CPR member and administrative team, compiling notes from all our research meetings, and memoing. In addition, I had check-in meetings with CPR members, which I describe in the interviews. In Table 6, I present the key activities and discuss the importance of each activity and the coding process.

I interviewed everyone in the CPR group and the leadership team at the school to launch the PAR in the fall semester. Each interview lasted approximately 45 minutes. The interview included questions about the support they provided for students who are not yet proficient in English, the different techniques they used to support or scaffold for student learning, how they dealt with assessment for EL learners, their personal beliefs about language learning, and how they used the students' first language (Arabic) when teaching content in English. The interviews provided clarity on the necessary first steps.

Table 6

Activities and Evidence: PAR Cycle One (August 2019–October 2019)

Date	Activity	Evidence
August 21–22	Interview Meeting with CPR group and admin team	Interview transcripts
August 26-September 30	CPR Meeting 1-on 1 Check-in meetings 2 Check-in meetings with chemistry teacher 2 Check-in meetings with math teacher	Meeting notes
September 25	Gallery walk and Introduction to Equity	Sticky notes and meeting notes
September 1-October 19	Memoing	Memoing notes

The CPR group had four meetings; I had two check-in meetings each with the math teacher and with the chemistry teacher. We discussed the different levels of language competency of the Grade 10 students and the teachers' general learning concerns in teaching math and chemistry. They discussed the need to provide the necessary support to their students to be successful. First, we needed to develop common definitions of equity and inclusion; to this end, at one of our meetings I organized a gallery walk and discussion. Helping them understand their perceptions of inclusion and equity and why creating equitable learning environments is a priority for everyone in the building was the foundation of the gallery walk. Once I felt everyone was able to reflect on their thinking about inclusion and their views on supporting learners who are not yet proficient in English, I thought we would have an easier time discussing and using strategies that are vital to closing the achievement gap with our learners who speak English as a second language.

The meetings included activities that helped us reach a consensus on the definition of equity. The team discussed the core values, vision, and mission of the school and how equity links to the school's overall belief of how to support all learners. The team then discussed incidents they had experienced of inequitable treatment. The meeting included a gallery walk that elicited the words that came to mind when they viewed four different photos related to equity.

I completed five bi-weekly memos during the process and received feedback from an instructor during the semester on the memos. The memos included a reflection on how I collected data and facilitated activities. The memoing supports me in better understanding and triangulating the data from the meetings and interviews.

Evidence Collection and Analysis

I collected and coded data from the interviews, the gallery walk, the check-in meetings, and the memos. Initially, I used an open coding process for identifying the codes from the interview transcripts, notes from check-in meetings, memos, and sticky notes from the gallery wall (Saldaña, 2016). This process was useful for initial coding as I was learning to do qualitative coding and analysis. The codes shifted in later analyses. Then, I analyzed how the codes were noted several times and were consistent across activities and determined as specific codes. Table 7 represents the codes that emerged from the four activities, which I then analyzed according to categories.

Evidence in Categories

Saldaña (2016) defines categories as the grouping of different codes that are conceptually the same. In this section, I describe six categories that were noted from the coded data; four of the categories address how second language learners communicate: (1) difficulties with communication, (2) risks due to lack of communication, (3) educators' beliefs about communication for second language learners, and (4) scaffolding support. The final two categories were less evident at this point of the data analysis, but I believed that the two categories may have more data as we move into the next cycle. I conclude the section with a discussion of codes that did not emerge as categories but that are on the watch list as possible areas for the next cycle of inquiry, which will entail observing classrooms to determine which language supports are used and how the emergent categories from PAR Cycle One take hold in practice in the second cycle.

Table 7

Codes from Interview Questions/Gallery Walk/ Check-In Meetings/Memos

Code	Frequency
Low performing	7
Strategy	7
Limited language	6
Goofing off because they cannot communicate	5
Love—require a lot of care	5
Requires diverse way of teaching and learning	5
Dictionary	5
Danger for teacher—we get in trouble	5
Need guidance	5
Not possible for success	5
Backbreaking for the teachers	5
Cannot do anything independent	5
All ELLs are from overseas	5
Research—what does the research say	4
Arabic—so different from English	4
Vocabulary table	4
Hard work—they just need to work harder	4
Guided reading	4
Vocabulary book for specific subject	4
Leadership support—professional development	4

Table 7 (continued)

Code	Frequency
Need more strategies	4
Scientific Method	4
Time consuming	4
Hard to communicate	4
Trouble—create trouble because they don't understand	4
Hard time understanding missed opportunities	4
Cannot be high level—no IB for them	4
Learning process changes	4
Change our ways	4
Failing	4
Difficult to be dual language learner	3
Spoonfeeding	3
Students act lazy—ELLs need to make more effort	3
Curriculum not designed for EL learners	3
Never use translation	3
All the time they need help	3
Work Wall	3
Unfair learning opportunities	3
Working together—cannot be independent	3
Easy to see issues	3
Need care	3

Table 7 (continued)

Code	Frequency
Collaboration necessary for teachers	2
Change how we do things	2

Difficulties with Communication

The teachers and the CPR group use the term *communication* to mean exchanging and learning information. In Table 8, the codes and subcodes support the subsequent analysis. The educators indicated the value of communication between teachers and students for exchanging information and learning; however, the initial evidence suggests that they have specific ideas about scaffolding based on the particularities of Arabic and mixed feelings about students involved in the process and that they want more support in developing strategies.

Educators in our school define communication as a vital aspect of the learning process for our students, but they often report that students with communication barriers are hard to work with, that language support is complicated, and that the role of the teacher in this process is complex. Arabic and English are different in terms of alphabet and grammar making it much harder for both teachers and students. The first code was "language-driven"; teachers shared concerns that their courses are not language classes and that any focus on language would take away from the time needed for math or science content. A subcode was noted in which teachers expressed that Arabic and English were different and complex languages; thus, finding some overlap when teaching vocabulary or grammar would be hard for both student and teacher.

The second code of "teacher role" focused on the difficult task of implementation. Teachers stated that math and science courses are not readily designed for ELLs, and putting interventions in place would be "backbreaking for teachers." The code "support interventions being complicated" means that learning support requirements needed for second language learners are not only complicated but time-consuming to implement because they are different than other support interventions teachers are currently required to put into place.

Table 8

Category: Difficulties with Communication

Category	Code
Difficulties with communication	Language-driven • Arabic—so different from English • Limited language Teacher Role • Curriculum not designed for ELLs • Hard to communicate • Backbreaking for teachers Support interventions are complicated • Learning process changes • Language-specific strategy Teachers beliefs about students • Goofing off because they cannot communicate • Cannot do anything independently • Hard work—they just need to work harder

For the last code, "teacher beliefs about students," the subcodes focused on the difficulties in communication and the ramifications these difficulties have on student learning. The fact that Arabic, the mother tongue for the majority of the learners, is so different than English makes communication and learning for the learners much more difficult. Some CPR members and administrators believe that the lack of communication played a role in general behavior in the class. Some attributed behavior such as "goofing off" or avoidance due to the difficulties students have learning and communicating in the classroom. Others discussed the hardship that lack of student communication has on their teaching.

The teachers indicated that they needed specific strategies to help them. The subcodes came up consistently in the interviews, check-in meetings, gallery walk, and memoing. For example, teachers made comments such as, "How can I teach them the content when they cannot understand?" or "We cannot stop and translate or explain over and over until they understand" (Teacher 1, check-in meeting, October 2, 2019). Some teachers believed communication was harder for them than the students. In one CPR meeting a teacher commented, "It is easier for them when they don't understand. They can just ignore us, but when we cannot express what they need to know, it is not something we can let go" (Teacher 2, check-in meeting October 9, 2019).

In her research on speaking difficulties of young EFL learners, Al Hosni (2014) finds that EL learners, no matter how much English they know, still face many speaking difficulties. They struggle with being able to communicate in the classroom and to express what they have learned; as a result, teachers are not always able to gauge what they have learned. Her meta-analysis of multiple studies indicates that student oral language development has mostly been neglected in the classroom despite its importance for the learning process. In the data collection, I found that

subcodes such as “limited language, hard to communicate, and cannot do anything independently” reflected the barriers to communication for learners. However, oral language only such as direct instruction, even as used by the teacher, hardly ever functions as a means for students to gain knowledge and explore ideas. Some form of written language support and intervention is needed. While the teachers were not resistant, they expressed the difficulties and frustrations they feel when trying to teach content in a second language.

Risks Due to Lack of Communication

The second category is how the CPR group, teachers, and the administration felt that ELLs were at risk for not succeeding due to lack of ability in the language of instruction. The codes for risk represented the second largest group of codes. The teachers discussed how barriers to communication in the classroom came with many risks not only for the students but for the teachers as well. Teachers perceive that lack of language ability will have negative effects on students both academically and behaviorally and can hurt teacher success if the teachers are unable to manage these risk factors. In Table 9, the codes and subcodes support the subsequent analysis.

Academic Difficulties

During the activities, several concerns about the students surfaced. Teachers were concerned about the possibility of student failure, which, in turn, led to lower teacher performance. The codes that were noted from the initial evidence included “risks to students academically,” “risks to students behaviorally,” and “risk to teachers.” The subcodes for risks to academic success included students having a hard time understanding and students failing specific courses combined with a high possibility of not succeeding in school in general. The CPR group expressed that while many of the EL learners they work with are strong

Table 9

Category: Risks Due to Lack of Communication

Category	Code
Risks Due to Lack of Communication	Risks to students academically Hard time understanding missed opportunities • Failing • Low performing Not possible for success Risks to students behaviorally • Trouble—create trouble because they don't understand • Unfair learning opportunities • Perception that kids are lazy Risk to teachers Danger for teacher—we get in trouble

academically, due to language barriers they do not test well *and* are unable to complete some class assignments.

Behavior Issues

The second group of subcodes indicated that teachers believed that the lack of language capacity led to increased behavioral issues in the classroom. In turn, they thought that this created a situation of unfair learning opportunities and weakening of student motivation. Finally, teachers perceive some students as lazy. In these subcodes we noted a focus on overall behavior patterns; teachers perceived that some of the weakest ELLs can cause off-task behavior in others. One teacher said, "When they don't understand, they make trouble" (Teacher 2, check-in meeting, September 4, 2019).

The last group of subcodes encompassed teachers' feelings that poor student performance would be blamed on them. They believe that "when the kids don't do well, we will get in trouble. But they don't do well not because of us, but because they don't understand" (Teacher 2, check-in meeting, September 17, 2019). The teachers were mainly concerned about overall performance of students and the issues that come up when students do not understand content and classroom culture and expectations. In addition, however, they were concerned that they would be perceived as unsuccessful by peers or supervisors.

Ultimately, the teachers expressed concern about the students' long-term abilities to succeed. Short and Fitzsimmons (2007) assert that EL students often work twice as hard to meet the same accountability standards as their native English-speaking peers since they are learning English while simultaneously studying core content subjects. The teachers were concerned that the achievement gap could affect students' college trajectory, their ability to be placed in appropriate programs, and their job opportunities later in life.

Teacher Risks

The last code on risks for teachers is important to note because these concerns ultimately play a role in teacher motivation and success. The teachers had concerns about how student performance reflects on them and had mixed feelings about students who do not seem to keep up; on the one hand, they are empathetic, but they also place responsibility on the students in ways that may not be supportive. The teachers fear that when EL learners do not score well, they might be held accountable.

When the teachers observed avoidance and bad behavior in the classroom, they perceived these as other risks for EL learners. The CPR group, administrators, and teachers associated misbehavior issues with students' language barriers. This was coded as a risk because misbehavior increases the chances of failure in the class. Thus, interventions and support are designed with the foundation of risk of failure that teachers have for themselves and their students. Some teachers are going into classrooms with a mindset that their learners are at risk and, therefore, they might not be providing the best intervention due to fear. Others seem to attribute the failure to students who are lazy. Some common quotes that came up were the fact that teachers were concerned that as they were teaching and students were trying to learn the material the lack of language ability would be a barrier to them understanding anything.

The second emerging category focused on risk factors that faculty at the school felt EL learners experienced due to their lack of language 2 knowledge. The communication risks were believed to have a negative impact in the classroom with both learning and behavior. The emerging category is important because perceptions or beliefs about ability play a role in motivation and success (Gardner, 1985). When teachers or students perceive they will fail or

cannot do well they will more likely try less and play into the narrative that their lack of proficiency cannot be improved.

Beliefs About Communication

Category three is the educators' beliefs regarding language learners. Beliefs about language competency and learning are an integral part of practice (Garcia, 2009). Tan (2011) examined how science and math teachers' beliefs influence their practices in the classroom. Tan's research supports the idea that certain beliefs about communication or lack of ability have an impact on how teachers practice in the classroom and the scaffolding they are willing to provide. In Table 10, the following codes and subcodes support the subsequent analysis.

This section includes not only teacher beliefs around communication but teacher biases about second language learners and the support they need. These biases are about students, interventions, and ability.

The third major emerging category includes three codes "beliefs about students," "beliefs about support interventions," and "beliefs about ability." If teachers have a general bias toward the ability of EL students who do not learn English quickly, the long-term effect might be substantial. During check-in meetings with teachers and CPR meetings, participants' personal beliefs guided not only their perceptions about learners but their practices in the classroom.

For example, when a teacher perceived that a certain student could not work independently because of language barriers, that teacher tended to ignore how hard the student worked or how well the student handled math or science content in Arabic. In that case, the teacher was less likely to recommend that student for higher-level math courses (Teacher 1, check-in meeting, August 13, 2019) and did not consider possible interventions that could help the students in higher-level classes. Other, evidence showed different beliefs that the educators

Table 10

Category: Beliefs about Communication

Category	Code
Beliefs about communication	Beliefs about students • Difficult to be dual language learner • All international students • All EL learners are from overseas • Easy to see issues Beliefs about support interventions • Love—require a lot of care • Requires diverse way of teaching to learn • Change our ways • Collaboration necessary for teachers Requires constant support • Need guidance Beliefs about ability • Cannot be high—no IB for them • Working together—cannot be independent

had, such as learners "not able to be independent, they cannot take high-level classes, and all are international students. However, the teachers supported interventions, and one teacher reported that it is "difficult to be a dual language learner; they need guidance, love, and a lot more care in terms of teaching" (Teacher 2, check-in meeting, September 17, 2019).

Another significant bias is that dual language learning is less seen as a positive and more negative in terms of difficulty and the support needed. The groups found dual-language learning to be difficult and requiring special guidance. The perception of the educators is that dual language learners have a barrier rather than a potential advantage in terms of long-term benefits. None of the teachers focused on the many benefits learners have when they can speak different languages and how it could benefit them.

These data are important for designing the scaffolding interventions that will be discussed in the next cycle of the PAR. Negative beliefs about communication might undermine teachers' motivation to implement a certain intervention. Teachers comments that became subcodes included "needing care," "needing love," "require diverse method of teaching" are clear indicators that teachers understand the importance of scaffolding supports. Our evidence also suggests that because teachers find these to be complicated and time-consuming, making these interventions a permanent part of practice will not be easy. If teachers believe that certain students just do not have the ability to access certain curriculum, they are unlikely to push certain interventions.

Oxford and Shearin (1994) found that teacher beliefs and attitudes could play a role in how students learn. Creating a low-anxiety classroom environment can be beneficial. The more anxiety teachers have about the content or level of success of their learners, the more this can transfer in the classroom environment. The higher the level of anxiety in the classroom, the

higher the failure related to language performance. The subcodes are directly connected to the bias that the educators have about language learners, such as not being able to take higher-level classes or the inability to work independently, will directly affect how they work with these learners in the classroom and the support they provide.

Scaffolding Support

Category four focused on the different scaffolding supports used in the classroom to help EL learners in math and science. These were scaffolding techniques that teachers consistently used based on their knowledge of language and what they believed were beneficial supports for the learner. The teachers focused directly on the implementation of supports to help the learner with math or science content that is taught in English. The CPR group and teacher's scaffolding techniques were based on practices they used to support EL learners in the classroom; discussions around scaffolding focused on what teachers were doing in the classroom to support learners and what opportunities they wish they could be provided to perfect what they were doing and to confirm that their practices were effective. In Table 11, the following codes and subcodes support the subsequent analysis.

The CPR group and the admin discussed the scaffolding techniques used in the classroom during the interviews, gallery walk, and check-ins meetings. The scaffolding was based on personal preference, ideas from professional development, and experiences they had as learners. The first group of subcodes included actual scaffolding practices that teachers used in the classroom to support EL learners. These included word walls, translation dictionaries, vocabulary books and tables, and guided reading methods. The teachers use these intermittently, but they have some sense that these specialized strategies would help the students in their classrooms.

Table 11

Category: Scaffolding Supports

Category	Code
Scaffolding Support	Classroom Support • Word Wall • Dictionary • Vocabulary • Guided reading • Vocabulary book for subject specific vocabulary Leadership support- profession development Professional development • Leadership support---- professional development • Need more strategies • Scientific method • Research—what does research say

However, most of the discussion was on how the scaffolding supports need to be stronger for science and math teachers. The subcodes of "leadership support, needing more strategies, having a scientific method on what works best, and being provided with research that will support them to make sure they are using the correct scaffolding techniques" were clear indicators that the math and science teachers do not feel confident when it comes to language support because many are not specialized or trained in this area. The expectations for leadership are for leaders to build capacity in this area with math and science teachers.

The teachers want to know the research on scaffolding techniques and develop long-term plans for providing language support in math and science classes. They expressed a desire to be a part of language training and typically depend on their own expertise, experience, and creativity to support EL learners. The CPR group, which includes math and science teachers, do not feel fully comfortable with incorporating language support into their classrooms and are looking to have the same training opportunities as language teachers. The math and science teachers shared that they do not have a background in language and so felt the "support of leadership was vital" (Teacher 1, check-in meeting, August 14, 2019).

An important issue that came up during the codes for this emerging category was the role that the school leadership plays in developing teachers. General efficacy is a belief that teaching will impact students learning no matter who the teacher is (Ashton & Webb, 1986; Bandura, 1997; Hargreaves & Fullan, 2012). Yet, my question is how can leadership help to support this efficacy within all teachers so they feel confident and comfortable with their practice and changing their practice when not impactful. That question is important in this emerging category because the teachers are pushing to have more support from leadership. The codes that came up included teachers needing more training and overall support such as language policies that are

clear with clear expectations of what they can and cannot do in the classroom from the leadership team.

In conclusion, the four emerging categories for the first round of data included difficulties with communication, risks due to lack of communication, educators' beliefs about communication for second language learners, and scaffolding support. Two emerging categories less frequently mentioned were beliefs about support and translation support for second language learners. While translation support and beliefs about support did not emerge as categories, the teachers did refer to how translation is used and why it is used in the classroom. Beliefs about support included statements about the educators' ideas about extra support provided to EL learners. The codes include their perceptions about general support such as it being "time-consuming, requiring a lot of effort, and feeling it was spoon-feeding learners." Some relevant codes about their beliefs about the effects of support included students becoming lazy because they get so much help and wasting time because of the extra support.

Implications

I examine the implications of PAR Cycle One, the evidence from the first cycle to determine the progress to respond to the overarching question and research questions. I discuss the sub-questions and review how the codes and categories suggest ways to respond to these questions. In this section, I review the implications on the PAR Cycle Two plan and what adjustments I needed to make to collect the necessary data to respond to the PAR research questions. The data represent beliefs and ideas about what teachers have been doing, what they have been doing to support EL learners, and what support they need to more fully engage learners.

Implications for the PAR Research Questions

The overarching question is: How can the first language be used to scaffold second language acquisition and learning? The sub-questions that guided the participatory action research include:

- For Arabic speaking students who are learning science and math in English, what pedagogical structures best support student learning?
- To what extent does the professional development for teachers support their ability to incorporate pedagogical structures that use the first language in assessments and lesson explanations to allow students to demonstrate learning in classes that are taught in English?
- How can the work on the PAR project with a team of co-practitioner researchers help to transform my leadership skills?

While I am unable to yet answer the first question, I was able to collect data that gave me initial insights into how the CPR group and leadership perceive the first language as a scaffold to second language acquisition. The CPR group members were already using scaffolding as a tool but not with consistency; typically, they reported that they used scaffolding based on student request as opposed to a specific model for teaching.

With my first sub-question, I was able to collect data that allowed me to delve more into detail on how learning science or math in English requires specific structures to support students. At this point in the research, the CPR group and leadership did not have a clear structure to support learners, but the CPR group and other teachers were using different structures they had designed in the class to support students in grasping the content.

The second sub-question on professional development for teachers indicates that they did not yet have a fully developed set of tools with which they feel comfortable. The teachers indicated that they want to know more; they described their knowledge as superficial; the supports are uneven provided to language learners based on CPR, administration, and teacher feedback from the activities. Some teachers discussed professional development hopes, and they indicated a need for more coaching and professional development opportunities for non-language teachers. That meant that during PAR Cycle Two, we needed to concentrate on some consistent use of strategies that teachers felt were useful and which they felt confident about using. Teachers will not deploy strategies with students unless they feel confident about using them.

Implications for Leadership

In discussing how my leadership ability and growth played a crucial factor in ensuring the success of our inquiry, I fully understood that improved teacher practice requires support and proper coaching on the part of leadership. I intended to shift my role as a leader to supporting the CPR group through this process. The CPR group was working with me and supportive of the work I was doing along with the administrative team: coaching and providing research data and suggesting research-based strategies to support their learning. To some degree, I increased my level of comfort in terms of coaching because so much of the work in check-in meetings involved intimate conversations about the specifics of the classroom, and I realized that the learning process is organic. Leadership was a code that came up consistently during our gallery walk and interviews, but at this point the evidence was too generic to say anything about how the work had yet changed my leadership. Many of the teachers and administrative team believed that leadership must play a role in creating a consistent system to support language learners. Individual teachers cannot do this alone in the classroom; school leaders need to create some

sense of urgency to support the EL learners. One teacher in the CPR group was only willing to implement specific scaffolding techniques if approved by leadership and wanted to make sure that their practices were both accepted and supported by leadership. Thus, my ability to navigate the needs of the teachers with the administrative team was important in moving the work forward.

In conclusion, while the PAR work had not yet substantially changed my leadership at this point in the PAR project, I stepped up as a leader of learning with the CPR group. This included being transparent with sharing my feedback, coaching on areas of refinement and success, and being readily available to support the CPR group with anything that is needed.

Implications for PAR Cycle Two

Two implications for the PAR Cycle Two, based on the current data, included identifying research-based scaffolding techniques currently being used in the classroom and supporting teachers to ensure that the techniques were more consistent. I wanted to ensure that the strategies were planned and not simply based on student request or perceived need in the moment, but became a systematic part of teaching practice. I needed to have extensive conversations with the CPR group regarding their mental models about communication and the different biases that came up during the coding process. I intended to engage in more classroom observation and provide feedback and coaching to the CPR group about what is working in terms of different scaffolding techniques. In the next cycle, I needed to set the conditions for encouraging the CPR group to share strategies that worked and to use them in math and chemistry. I needed to work on providing more opportunities to discuss the issue of equity that needs to be addressed when it comes to EL language learners. That is a dual question of access to the classroom learning and the level of rigor expected of the EL learners.

In conclusion, the check-in meetings, gallery walk, interviews, and memoing have given me a good indication of the specific areas of focus for the CPR group, teachers, and the administrative team. While I was not yet completely sure about the where the data were leading, I have been able to make some connections and create initial categories. Two parts of the research questions have been addressed at an initial level of understanding, and with PAR Cycle Two I collected additional data to address the questions in more depth. Chapter 6 provides detail on PAR Cycle Two activities, evidence and data analysis that comes when I engaged in with the CPR group and teachers.

CHAPTER 6: PAR CYCLE TWO

In the participatory action research project and study, I focus on the use of the first language to scaffold second language acquisition. In other words, how can teachers use scaffolding methods using the first language to teach content material in the second language? Since for many schools second language learning is the norm of the classroom, teachers' planning and preparation requires consideration of both the languages learners need (Fischer & Immordino-Yang, 2008). In the first cycle, I sought to better understand the CPR group members' mental models about teaching ELLs. I wanted to understand the rationale behind why and how math and science teachers use specific scaffolding techniques in classrooms with second language learners and what they believed about scaffolding practices. The mental models they have built inform their rationales for interventions and constitute a key source of their decision-making when it comes to supporting students. When teachers believe a first language is an asset, the teacher is often keener on keeping it intact and not losing the first language at the expense of the second language (Garcia, 2009).

The responsibility of a school leader is to provide teachers with the best method to support learners in an equitable way so that the first language is not sacrificed for the second. Thus, my goal was to find equitable language scaffolding techniques that incorporated the first language when teaching math or science. The research-based practices not only help learners learn a second language, but also provide learners with an opportunity to see their first language as an asset, not a barrier.

In this chapter, I first outline the activities in PAR Cycle Two. The CPR group and I collected data and implemented interventions in the classroom to support language learners. I

developed themes based on our analysis of the data. As a result, we reached conclusions after evaluation of the consistency and frequency of the data.

In the next section, I discuss the themes that emerged from the data and describe the key findings. I then use the organizational model of systems thinking approach to better understand the school organization and how systems thinking or lack thereof influenced the project and study. I use this model because of the three aspects of the systems thinking model include mental models, learning organizations, and a systems approach, which are the foundation of the work I was doing at the school. Using the model enabled me to better understand how to use data to create interventions and implement the interventions in a particular school environment. The chapter concludes with the implications of the research for the focus of practice and my leadership.

Activities and Analysis

In this section, I share the range of activities that supported the second PAR cycle of data collection and analysis. I worked closely with the CPR group to examine interventions to address the many concerns from the PAR Cycle One.

Key Activities

The key activities in PAR Cycle Two included CPR and check-in meetings, classroom observations, and memos. In Table 12, I detail the key activities and discuss the importance of each activity and the coding process.

Meetings

The CPR group and I met consistently during this process and more frequently than in Cycle One; the 20 meetings included nine group sessions and 11 individual check-in meetings. We co-developed scaffolding interventions. After classroom observations, we met again to

Table 12

Activities and Evidence: PAR Cycle Two (November 2019–March 2020)

Date	Activity	Evidence
November–March	CPR Meeting (n=9) 1:1 Check-in meetings (n=11)	Meeting notes
November–March	Classroom observations (n=8)	Classroom observation notes
November–March	Memoing (n=9)	Reflective memos

discuss the impact of the interventions on students and what needed to be changed. In the CPR check-ins during this period, we focused on each teacher's content area and her specific needs. The CPR meetings were beneficial for implementing scaffolding interventions. While I know that meeting consistently can have a significant impact on practices, I was surprised to see how much we began to change mental models by meeting and sharing research-based interventions.

Classroom Observations

After the CPR meetings in which we discussed specific scaffolding interventions that we had agreed to put in place, I observed a total of eight classes, four observations for math and four for science. In pre-conferences, the teachers and I discussed the interventions that would be used to support learners. Our goal in each session was to brainstorm and finalize an intervention, use it for two weeks, and discuss the interventions and the impact they were having on student learning. None of the visits was a surprise, and, at many times, the students were notified that I would be observing. I used codes from Observation Toolkit: Observing for Equity (Tredway, 2019) to code all classroom observations.

Memoing

I completed a total of nine reflective memos during this cycle. Generally, I completed these memos at the end of the week after meeting with the CPR group and usually after a class observation. The memo topics included specific discussions, observations, and frustrations. I found that in the first set of memos from PAR Cycle One, I had no frustrations; however, in PAR Cycle Two, four of the memos included the frustrations that occurred after a CPR meeting or classroom observation. To monitor and support the implementation of scaffolding interventions, I had to ensure that our discussions led to plans and that the plans were then implemented in the classroom. As with implementing anything new, we encountered some bumps, and we needed to

make several adjustments based on student and teacher needs. These occurrences required us to change interventions three times until we were consistent with implementing interventions that would be used reliably in both classes. Memoing allowed me to understand the data better and supported me to triangulate the evidence from other sources.

Evidence Collection and Analysis

I collected and coded the data from the check-in meetings, classroom observations, and memos. I coded the data and noted the overlap with data from the first cycle. Similar to PAR Cycle One, I identified codes for the meeting and check-in notes, classroom observations, and memos. After identifying the codes, I analyzed which codes were consistent in terms of meaning and frequency. I then analyzed these categories for themes.

Three themes emerged: teacher beliefs about language, scaffolding support, and teacher consistency. Themes 1 and 2 were emerging categories in PAR Cycle One. Theme 3 was not an emerging category, but was consistent in all three activities in PAR Cycle Two and was evident as we moved from theory in Cycle One to implementation of the interventions in Cycle Two.

Meetings

The coded data from meetings dedicated this time to teachers sharing their opinions on the interventions. Many of brainstorming sessions included a discussion of teacher beliefs about how interventions should work. Some examples indicated a positive response to translating from the science CPR member, as in “I think this would be best for the kids” or “I think when we are translating, we should have them write their own words” (Teacher 2, CPR meeting, January 16, 2020). However, other comments indicated teacher reticence about the translation: “I believe the way to help our students is with limited translation, when I was a student, they did not do so much translation” (Teacher 1, check-in meeting, January 14, 2020). During many of our CPR

meetings, the focus would drift to teachers' beliefs, and I was unable to move the discussion to research about the value of scaffolding interventions. The general sense of teachers' beliefs can be summarized in one statement: "We know what is best for our students" (Teacher 2, CPR meeting January 23, 2020).

Classroom Observations

I intentionally focused classroom observation data on the scaffolding interventions that supported students with learning specific content and the responses to the use of translation. The major codes that emerged during this data collection were the types of translation interventions: translating on the board, translating when speaking, translating on documents including assessments or providing translation dictionaries. The most common form of translation was while speaking. The teachers did not necessarily plan to translate verbally but did so when students did not seem to understand. Only two classroom visits were during an assessment, and dictionaries were not used or accepted by the students. The most successful method was allowing students to write their own words in Arabic as teachers translated the word from English.

Teacher skepticism about the use of translation was evident in the comments they made. Negative comments about translation were more frequent while students' comments were more often positive. Teachers said things like, "Don't be lazy." "You want me to do all the work." "Don't use this as a stick to carry yourself with." By contrast, students' comments were more positive "This is so much easier." "It's better when you guys are both doing it." "Can you write it out for us?" and "Can you keep translating?"

Memos

What surfaced during the memoing process was my frustration about teachers sharing beliefs with no research or support for why these interventions might work. Clearly, the students'

positivity did not deter the teachers from making negative comments about the scaffolding interventions. Teachers' beliefs were a prominent point of memos; another prominent point in the memos was the positive outlook that both teachers and students had about working together and using the same scaffolding interventions in the class. Students would comment that math and science teachers were using similar techniques, and teachers liked that they were collaborating. The students said things such as:

- "It is easier when we are doing things together."
- "We like it when Abla (teacher) does it the same way."
- "Why are we only getting help in math and science?"
- "Will it be like this all the time? I will do better if it is"

The teachers commented "It helps me when she explains first because she is in charge." "She helps my students to better understand the plan, and I think I help her too" (Z. Hotaki, Reflective memo, January 22, 2020).

In conclusion, the coded evidence from the three activities allowed me to derive emerging categories and move toward understanding the emerging themes. Two emerging categories from PAR Cycle One became more prominent and are the themes of PAR Cycle Two, and they are: teacher beliefs and scaffolding supports. As the final PAR cycle, I can confidently conclude that two of the themes inform the key findings. These themes have been supported from both PAR Cycle One.

The third category is implementation practices—how the scaffolding interventions were being implemented in the classroom and the perceptions from the students and teachers on this implementation. The importance of consistency is a third theme. This perception came out the most consistently and frequently while I analyzed my coded data, leading to teaching consistency

as a third emerging theme. The three themes that I focus on in the evidence are teacher beliefs around language learning, scaffolding supports, and teacher consistency. The evidence indicates the following: teachers' beliefs about practice play a critical role in how they practice; the different scaffolding supports that teachers are willing to use; and teacher consistency leads to greater impact. The evidence analysis resulted from the observations and meetings of the CPR group and my memos during Cycle Two.

Supporting Language Learners to Succeed

In this section, I identify the themes that I have derived through the analysis of evidence from PAR Cycles One and Two: (1) teachers' beliefs; (2) scaffolding supports; and (3) teacher consistency. For each of these themes, I discuss the evidence and how the theme relates to the research. Teachers' beliefs about practices and students play the strongest role in determining their use of scaffolding. The teachers' mental models influence their thoughts, comments, and actions and dominate their choices despite research evidence to the contrary. Secondly, certain scaffolding interventions supported key groups of students more than other interventions and seem to be more successful. Finally, if teachers consistently use the same scaffolding supports, the implementation process is easier for both students and teachers.

Teachers' Beliefs

Mental models and beliefs played a critical role in the implementation of scaffolding interventions. They determined what the teachers were willing to do and how effectively they enacted the scaffolding techniques. Teachers voiced their beliefs about practice and student learning eight times in the evidence, almost double that of the other two themes.

Three overlapping elements of teachers' beliefs are evident: their personal beliefs about teaching practices and students; ideas about how the scaffolding practices might have negative,

long-term effects on student learning; and an outcome of these beliefs is the teachers' reliance on beliefs instead of research. The theme of teachers' beliefs was prominent in both PAR cycles. Figure 8 on teacher beliefs illustrates the three key elements related to their beliefs. I discuss each element of teacher beliefs and suggest that although they consider other ideas from research, they return to belief systems as the guide to their practices.

In the conversations with teachers in PAR Cycle Two, I found that personal beliefs about practice and students dominated decisions, although teachers considered research findings that showed certain practices to be beneficial to learning, they returned to their personal beliefs to guide their classroom practices (see Figure 8). Despite positive student responses, which I discuss in the finding on consistency, the teachers continued to vacillate between providing students support and worrying about enabling students too much. As the cycle progressed, they decided that too much scaffolding would hurt students. Teacher beliefs about practice and then teacher beliefs about students, both of which guided our brainstorming sessions on finding the best scaffolding interventions. During individual check-in meetings, teachers shared personal beliefs about what they considered acceptable in terms of scaffolding interventions. The CPR group was comfortable about sharing their experiences, both professional and personal, when discussing their beliefs, which became their theories about language learning.

Practice Beliefs

Although we discussed and used scaffolding strategies successfully, teachers relied heavily on prior beliefs about scaffolding. Teachers shared their specific ideas about which scaffolding interventions were the best to use with students during class discussions. Whenever we discussed possible interventions that we were going to put in place or reflected on how successful interventions were, we returned to discussions as to why specific interventions work

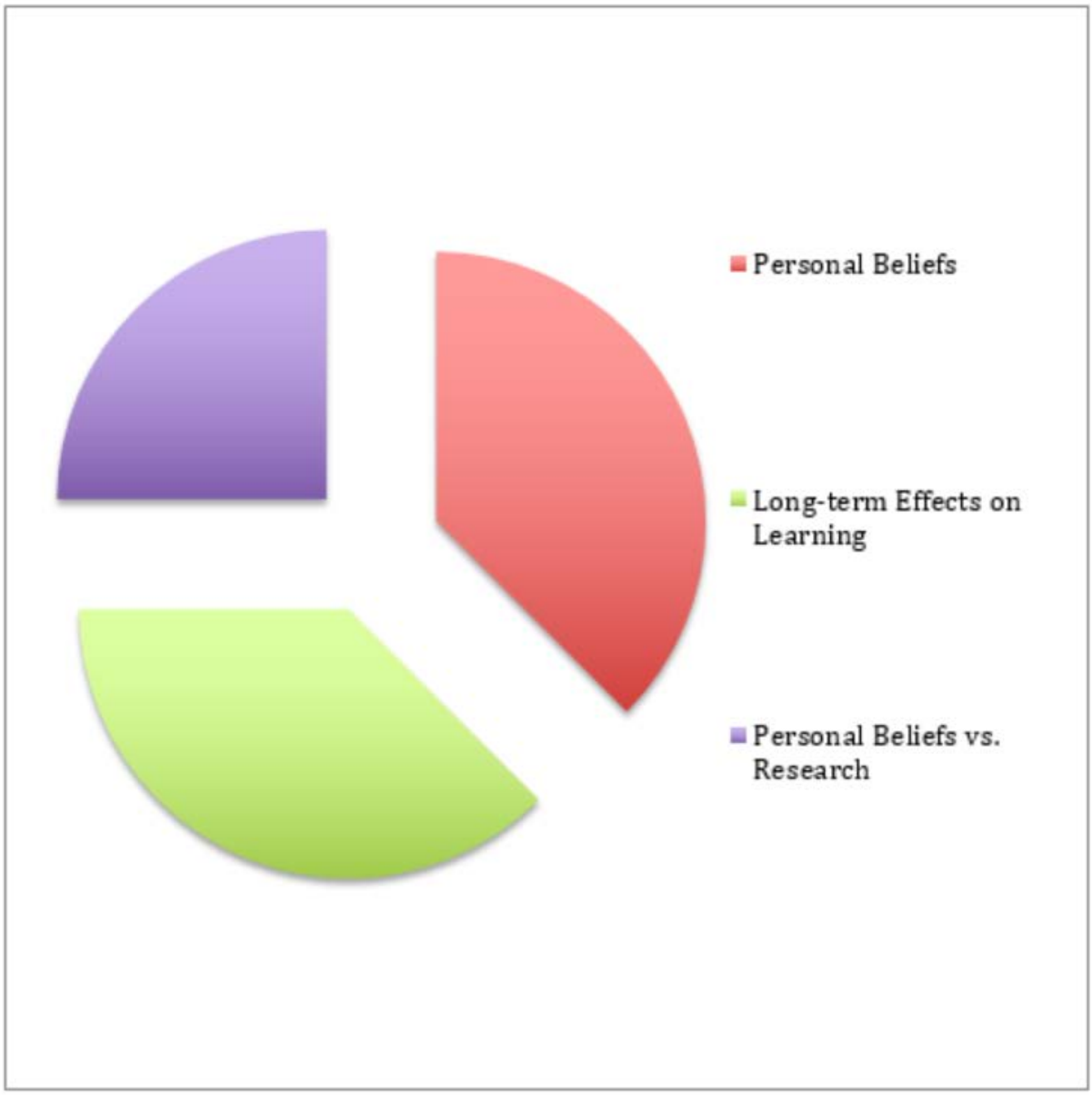


Figure 8. Teachers' beliefs.

own or others' experiences. Some common comments when we were finalizing individual scaffolding interventions were: "This is not how I should do it." "I don't believe that is right" (Teachers 1 and 2, CPR meeting, January 23, 2020). These comments applied to the scaffolding interventions for translation usage during assessments and during a class lesson the above comments related to whether teachers should translate on assessments.

While teachers seemed to support scaffolding during teaching, they were less sure about whether to support testing and assessment by using translation. During our check-in meeting and CPR group meeting, Teachers 1 and 2 were fearful that too much translation scaffolding was harmful. Their argument was that they just believed "this is wrong" (Teacher 1, check-in meeting, November 18, 2019). Teacher 2 believed that "too much translation would make kids lazy" (Teacher 2, CPR meeting, December 19, 2019). Most of these ideas were from previous experiences or personal experiences, including experiences from their college days: "I had a hard time when my teacher spoke in Arabic during classes and teaching. When I was taking my test, I would fail because it was in English" (Teacher 1, check-in meeting, November 18, 2019). Beliefs about practices were the hardest to discuss because both Teacher 1 and 2 felt strongly that their experiences mattered, and they wanted that to be taken into consideration when creating a scaffolding plan.

Beliefs about Students

Teachers had three concerns related to students: (1) students would become dependent on scaffolding; (2) scaffolding is not used in testing and, therefore, might hurt students; and (3) students might become lazy. Although scaffolding often supported students in learning, teachers were more concerned about student dependence on scaffolding. They believed that the more

scaffolding support they received, the more the students would be dependent and need it to survive when learning anything new.

CPR teachers pushed back on this idea using a large amount of scaffolding on assessments because assessments outside of their classes would not include the translation and would hurt the students later on. “What happens when they are in university and there is no accommodation? What will they do? Just fail” (Teacher 1, check-in meeting, November 18, 2019).

Tan (2011) discusses how math and science teachers’ personal beliefs about content learning is so important to understanding what type of interventions they are willing to use in the classrooms. Tan’s work delves into the beliefs of math and science teachers and the influence of these beliefs on their pedagogical practice in content-based language instruction. Tan concluded that teachers’ beliefs about their respective roles as content rather than language teachers limit students’ language-learning opportunities. Tan’s findings reveal the lack of collaboration between content and language teachers and the need for sustained professional development concerning content and language integration for both groups of teachers. Teachers’ beliefs play a major role in determining not only the scaffolding approaches they are willing to implement, but also how sustainable these interventions are in their overall long-term practice. Their beliefs about students express their concerns about student progress; if they use scaffolding, they worry it will harm students.

Long-term Effects on Learning

During conversations with teachers about beliefs around language learning they focused on how translation would be used in the class long-term for students. In terms of long-term effects, the teachers believed that too much scaffolding led to learned helplessness and lack of

productivity that decreased motivation. In discussions and observations, the teachers expressed concerns about simplifying the language and making the work too easy for students.

Learned helplessness is defined as students' beliefs that their efforts or behaviors do not influence the learning outcome. Over time, EL learners, no matter the amount of effort, exhibit that feeling when they are unable to speak the content language (Walling & Martinek, 1995). When useful scaffolding supports are not implemented intentionally and routinely, learned helplessness can become worse, eventually leading to negative beliefs about themselves and higher risk for failure. Both Teachers 1 and 2 brought up this issue and framed it in a different way. They did not specifically acknowledge that learned helplessness leads to lack of motivation; rather, they believed that if a large amount of support is provided to the students, the continued support would have negative consequences in terms of preparing them for testing when the supports are unavailable. They did not see how providing scaffolding with a gradual release of support could boost student confidence. Teachers' ideas were static; instead of viewing the scaffolding as a learning opportunity, they could not visualize how scaffolding could help students overcome learned helplessness. Rather, they viewed student responses as laziness (Teacher 1 and Teacher 2, CPR meeting, December 8, 2019).

Teachers worried that students would not be productive unless they experienced barriers that they needed to overcome; if those barriers were not present, they would exhibit decreased motivation. The teachers believed that the students lacked the will to accomplish something or try if teachers put in all the work. "If we do all this work and the class is easy for them, why should they try? What should they try for?" (Teacher 1 and Teacher 2, CPR meeting, December 8, 2019). They believed that EL learners did not work as hard as other students and expected teachers to do too much for them.

During the discussions teachers believed the ethics of scaffolding versus making learning experiences too easy were a significant impediment to teachers agreeing to change their practice. The teachers felt "the bigger the barrier, the sweeter the reward" and the more a learner would grow once they overcame it (Teacher 1, CPR meeting, November 12, 2019). When asked about what happens to the learners who cannot overcome, they did not fully respond. During CPR meetings and check-ins, we discussed how some learners would be unable to overcome language barriers without scaffolding interventions. Yet, the belief that barriers "would make them stronger" continued to influence how they understood scaffolding support (Teacher 2, check-in meeting, January 10, 2019).

In her normative study about language support, Janzen (2008) found that students who had limited support had greater barriers and were less likely to be able to access the curriculum. Hart and Lee (2003) focused on math and science teachers and how teacher beliefs about support can either hinder or help a learner's progress. Despite the research findings, the teachers decided more support might cause more harm in the long term. The teachers remained firm in their beliefs that they might encourage learned helplessness if they "do too much for them" (Teacher 2, check-in meeting, October 16, 2019 and Teacher 2, check-in meeting, December 19, 2019). Garcia (2009) discussed that we should be providing much more scaffolding support for EL learners, without which they would fall behind, creating the current gap that is noted in so many schools with EL learners especially in math and science. The concept that intervention support is "an extra" is a misconception that hurts the students in the long run. Baker (2017) discussed the need to support EL learners not only with language but also emotional support. ELLs feel they are outliers and this confirms that teachers are not creating a learned helplessness but providing

tools so learners can move forward and have the same opportunities as those learners who speak English as first language. However, the teachers did not find the research persuasive.

Conflict with the Research

Finally, from the analysis of the evidence, I determined that the conflict between personal beliefs and the research tended to dominate our discussion and their decisions; in the case of the teachers, personal experiences outweighed research-based interventions. In half of the CPR meeting and one-on-one meetings, we discussed research-based interventions to use in the classroom. I spoke to the CPR group about the importance of using the research to guide our interventions. Nonetheless, the following statement typically would follow any discussion: "That is what I think." Teachers believed that Arabic was a unique language and that we could not use research based on other languages to guide us. In addition, the difficulty of planning and preparing the research-based strategy affected their willingness to use the technique.

In discussing the importance of using experience to guide our work as opposed to research, they believed “our students and language is more complex” (Teacher 2, check-in meeting, January10, 2020). The two CPR teachers felt that Arabic was more uncommon in the US, and, unlike some languages such as Chinese or Spanish, the same amount of support could not be used for Arabic-speaking students. The CPR teachers believed that Arabic is more complex because the letters and sounds are so different from the English language (Teacher 2, check-in meeting, January 10, 2019).

When we explored scaffolding techniques and what has worked and has not worked in the classroom to support the learners, another factor for teachers was the payoff given the effort involved between the difficulty of implementing the interventions and the likelihood of success. A teacher comment like "this is way too difficult,” indicated that the strategy was personally

tricky or time-consuming for the teacher, and that barrier usually took precedence over the fact that the intervention was research-based. Thus, the discussions about scaffolding included what is the most feasible to do in terms of complexity and teacher ability.

Teachers, like students, seemed to be most comfortable with what they can do successfully and independently. Although teachers used scaffolding techniques in classroom because students needed them, they were generally unwilling to formally adopt research-based strategies. Between their belief about how Arabic was different and the complexity of the intervention, they were unlikely to accept the research and relied on their prior experiences. In the next section on scaffolding, I discuss more specifically how teachers found the strategies too complicated to use.

Scaffolding Supports

Scaffolding is a general education term that includes a variety of instructional techniques used to move students toward a better understanding and, ultimately, greater independence in learning specific content. In this context, scaffolding meant specific language instruction techniques that were successful for second language learners. All the scaffolding supports included the use of first language to support learning a second, including dictionaries and verbal or written translation of both content and specific terms. Specific scaffolding interventions included using dictionaries during classwork and assessments; writing subject-specific vocabulary on the board and translating it into Arabic; or providing translations of specific words, command terms, and rubric words on worksheets and assessment documents.

The CPR teachers used an array of scaffolding techniques to support their student to better grasp the math and science content. However, their brainstorming about scaffolding supports focused on what was the most convenient to implement and what would have the most

significant impact. The use of scaffolding continued to intersect with the conflict the CPR teachers had with research. Which scaffolding technique the CPR teacher wanted to use was based on personal experience and ease and rarely on research. Despite convenience as a guide, we successfully implemented several scaffolding strategies that supported student engagement and learning. Figure 9 indicates the two elements related to scaffolding.

Convenience with Implementation

For the most part, convenience could be defined as easy to do "on the spot" in the lesson without significant pre-planning. During classroom discussions, teachers translated content if students had questions or if they wanted to delve into more detail on specific topics. Despite their ambivalence, teachers did undertake some selective use of scaffolding. First of all, the issue was amount of translation, as long as it wasn't very much; secondly, the teachers did not want cumbersome strategies.

Whether or not some of these scaffolding interventions were possible depended on the amount and type of translation, that is, how easy it would be to implement the different translation interventions or, as Teacher 2 expressed it, "translation but just a little" and "Let them do it themselves" (CPR meeting, December 19, 2019). For both teachers, convenience was usually a deciding factor. Convenience here is not only defined as what was easiest but the scaffolding intervention that was the most accessible to them in terms of their ability. Teachers also were reluctant to use interventions that would absorb too much class time (Teacher 1, check-in meeting, January 23, 2020).

The difficulty of the scaffolding strategy was another key factor in all decisions. Teachers thought the students should create vocabulary books/translation notes and this should not be an

Figure 9. Scaffolding interventions.

expectation for a teacher. Teachers felt that translating a large amount of content and working on rubric/direction translation documents was not feasible. A vital aspect to consider for this area is building teacher efficacy in terms of teachers feeling safe in environments to express why they engage in certain practices. To have an honest conversation that the harder the work they were expected to do the less likely they are willing to do it is usually conversations that are not shared with leadership out of fear of retaliation. Donohoo et al. (2018) reinforce the idea that teacher efficacy is a key factor that must be understood and incorporated when discussing teacher growth and areas of refinement and implementation of any type of change or intervention.

The more difficult the scaffolding technique/intervention for the teacher, the less likely the teachers were willing to implement it in the classroom. For example, students appreciated and wanted translations of the assignment rubric, but teachers expressed major concerns about how tedious and time-consuming the task would be. In general the more skilled teachers are in specific practices, the more likely they tend to disregard research and retain current practices in the classroom. During the CPR meetings, teachers consistently shared familiar practices and encouraged others to use them as well.

Greatest Impact

Our conversations about scaffolding interventions and supports focused on what would require the least effort but have the most significant impact. The CPR group felt that they had more content to teach compared to language teachers and that adding language learning to the class would take a lot of time away from their math and science curriculum (Teacher 1, check-in meeting, January 16, 2020). Having specific scaffolding techniques that were easy to implement was essential for them to if they were going to use them consistently. These strategies included written translation, spoken translation, dictionaries, word walls, and vocabulary books. The least

successful was using dictionaries. Written translation includes subject-specific vocabulary words, rubrics, directions, and command terms translated from English to Arabic for example in Figures 10 and 11.

The spoken translation is the translation that occurs during class lessons when the teacher is teaching specific content or during explanations of assessments. The spoken translation can be pre-planned or done on an add needed basis.

Comments about dictionaries included "using a dictionary but only for tests"; therefore, teachers did not engage in fully translating the words because they believed students should be looking up these words in the translation dictionary. This idea arose consistently with the teachers stating that, when left to students, they most likely would not spend time using the dictionary. The CPR group did have dictionaries in classes, but students rarely consulted them. They were unsure why the dictionaries were not used. They mentioned in one meeting that the process of trying to find the word in the dictionary and understand the Arabic word in the context of the class assignment was time-consuming.

During class observations, teachers translated specific words during the lecture and wrote the words on the board (Teacher 1, classroom observation, January 15, 2020). During the introduction to a new unit of study, they created word walls with student input (Teacher 2, classroom observation, December 11, 2019). I observed and heard students state, "This makes it easier" (Teacher 1, classroom observation, January 15, 2020).

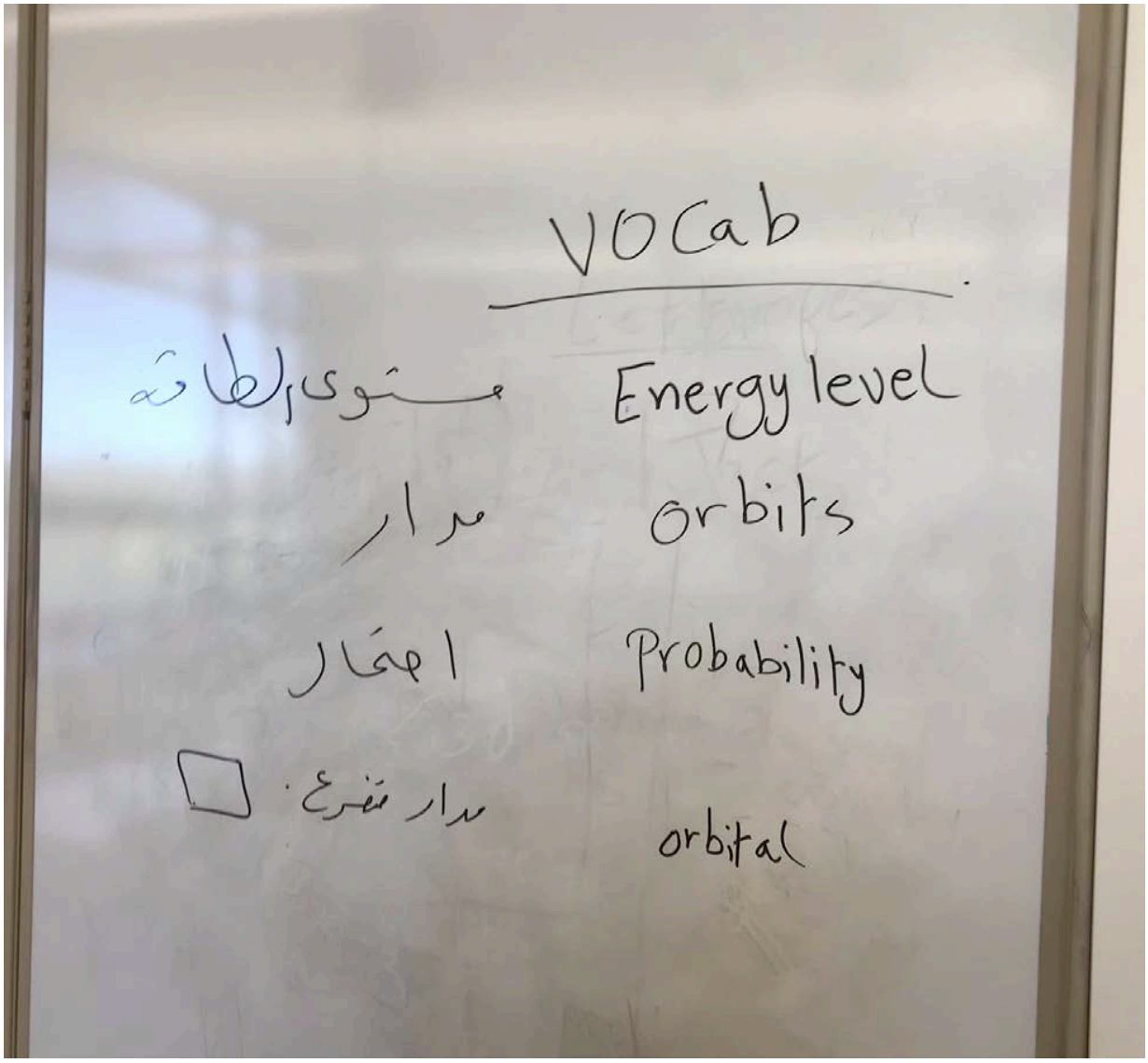
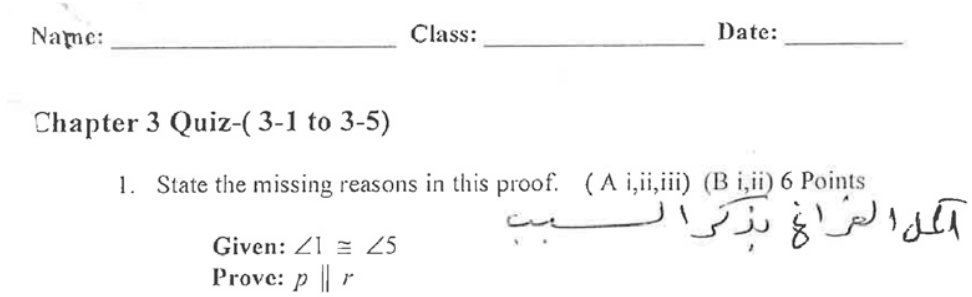


Figure 10. Written translation in chemistry.



Name: _____ Class: _____ Date: _____

Chapter 3 Quiz-(3-1 to 3-5)

1. State the missing reasons in this proof. (A i,ii,iii) (B i,ii) 6 Points

Given: $\angle 1 \cong \angle 5$
Prove: $p \parallel r$

Figure 11. Written translation in geometry.

The CPR group felt the word wall for each unit was beneficial and feasible to do in each class. Students could help create them before class, and they would be accessible anytime, including on assessments. Also, the CPR group found that when subject-specific terminology was translated on assessments, students had a better understanding of the questions (Teacher 1, CPR meeting, December 9, 2019). The CPR group noted that subject-specific words were a significant barrier for the students when trying to understand concepts.

Another significant topic was translating during lectures, including moving into Arabic to review specific points or concepts or to reiterate a vital issue. This scaffolding intervention is the most controversial in terms of effectiveness. The CPR group did bring up that once you move into Arabic during the lecture, it becomes easy to stay in Arabic (Teacher 2, CPR meeting, December 9, 2019). It becomes a safety net for students who may wait for the Arabic explanation to start and only focus on that section of the lecture.

In conclusion, the teachers considered spoken translation scaffolding in the classroom the easiest to implement with the most significant impact. The teachers did not have to prepare in advance, and students felt it helped them understand content more than any other scaffolding technique. While teachers did express concern that once teaching in Arabic started, it was hard to go back to English, it was the easiest and took little time from their content teaching.

Consistency

A new theme in PAR Cycle Two was consistency. With the Par Cycle Two focus on implementation instead of research and theory, I found that making sure the CPR group was being consistent in the use of scaffolding strategies was essential to both the CPR group and the students. In eight classroom observations over two months, the scaffolding strategies used most consistently were perceived by teachers and students as most useful. However, because of the

preceding findings, the scaffolding strategies could perhaps have been even more useful if certain strategies had been attempted. Figure 12 indicates the two elements related to consistency.

Student Perception

Typically, the CPR teachers did not have a common process or procedure for supporting EL students. Some were given extra language support with an ESL teacher during science/math classes, but these were usually students who had just come to the country. The students who were EL learners and had some degree of English proficiency remained in the class with the expectation that science and math teachers would need to support them. During classroom observations, many of these students stated they felt overwhelmed with the content because of the language barrier. However, many students reported that when teachers used the same scaffolding strategies consistently, the lessons were easier because they knew what to expect.

In six out of the eight classroom observations, when both the science and math teacher used the same scaffolding intervention, students noticed and commented on it. "Both are doing it; it is easier." Other students made similar comments. “The other (Abla) is also doing that for us” (Teacher 2, classroom observation, January 17, 2020). Students found that when both members of the CPR explained a scaffolding strategy in similar terms, the students were able to understand how to better engage. With the collaboration required in the PAR for the CPR teacher, the teachers explained and expectations consistent in each of their class. The students worked with specific support strategies in both classes with each teacher supporting the same idea.

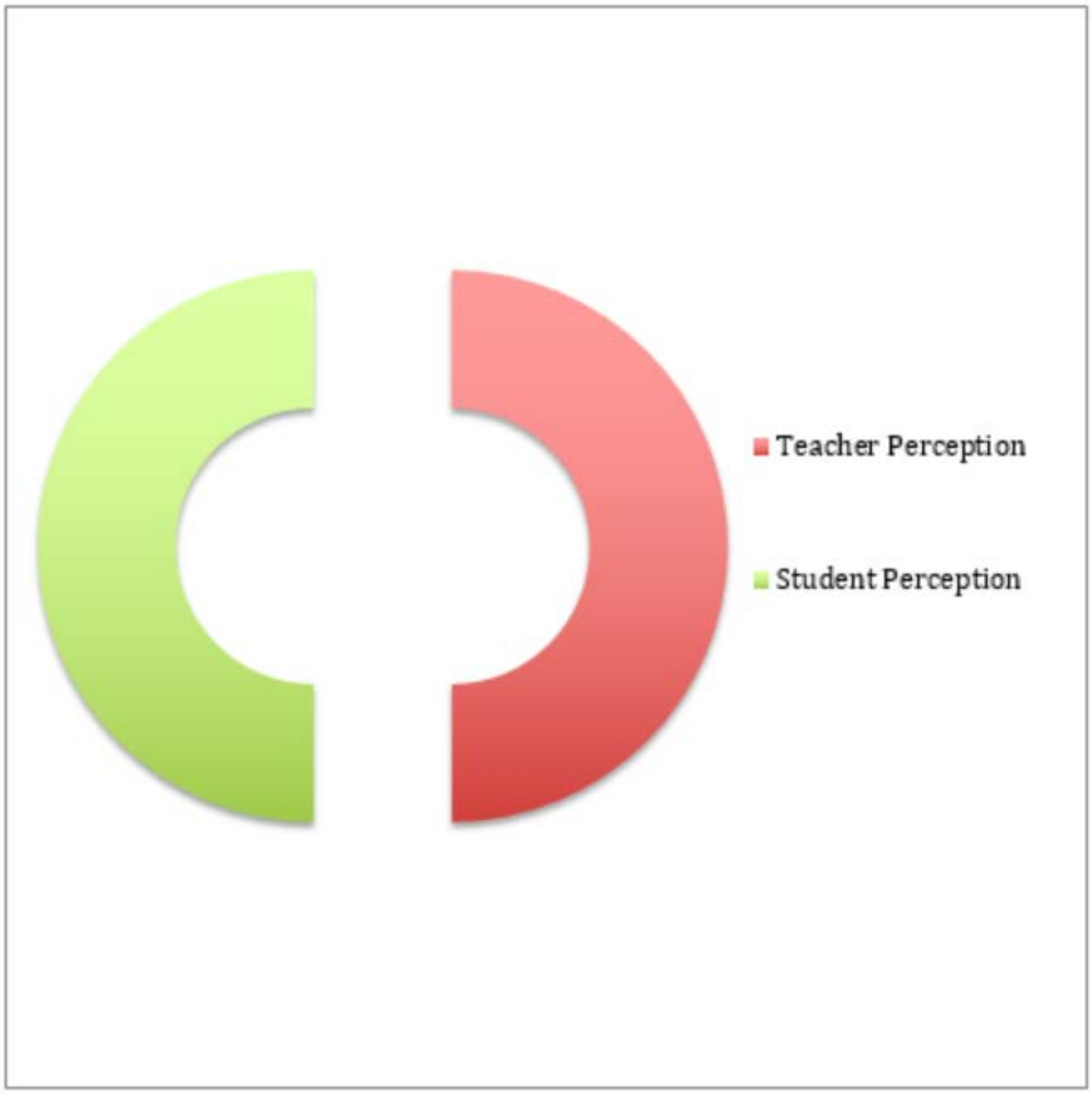


Figure 12. Consistency.

Teacher Perception

The teachers maintained consistency by regular meetings with peers in which they felt mutual support and accountability. The CPR teachers mentioned consistency when reflecting on how scaffolding interventions were working. The CPR group noted that "together was a lot easier." Regularity of use was discussed during both individual checks-ins and the CPR group meetings. CPR teachers found that when one teacher was doing the interventions, it supported the other teacher to use that scaffolding intervention and make sure they used it the way they had discussed (Teacher 1, CPR Meeting, January 23, 2020). CPR teachers felt it held them accountable to make sure they did not change or tweak things because they knew it would affect the other teacher. The CPR group felt using the scaffolding interventions as a small learning community forced them to work outside of their department with another teacher with whom they would not usually work in such detail (Teacher 2, CPR meeting, January 23, 2020). They felt more comfortable with each other because neither was a language teacher. This made them more comfortable with the fact that they both had limited language teaching ability. This is consistent with our action theory and our attempt to build capacity with teachers and making sure science and math teachers are comfortable in this area.

Bandura's (1997) work on self-efficacy is critical; teachers were beginning to learn to count on each other and gain a sense of efficacy as language teachers as well as content teachers. While quite tentative, the more support and encouragement teachers got from each other, the more they perceived their ability to perform that task, their attitudes became more positive, and they were more likely to try harder and complete the task. Although they did not often challenge themselves to incorporate new techniques, they were at the beginning stages of being comfortable with language learning strategies in their respective content areas.

In conclusion, our PAR Cycle Two themes of teachers' beliefs, scaffolding supports, and consistency support the findings that I discuss next. I found that introducing scaffolding for ELLs in content classes is complex. Clearly, teachers' personal beliefs play an integral role in their practices; scaffolding support procedures depended on personal experience and ease; and consistency with supports was perceived as positive by both teachers and students.

Key Findings

In this section I detail the two key findings evident from the two cycles of inquiry; those findings support the importance of scaffolding for ELLs in high school science and math classrooms. First, teachers in the PAR study relied on their prior experience/beliefs to guide their classroom practices instead of using research. Teachers had strong beliefs about student learning and language acquisition from the start of PAR Cycle One, and those beliefs guided their practices. Despite conversations for two cycles of inquiry, their practices did not make any major shifts even after being exposed to research that supported other strategies. Second, teachers were hesitant about using a repertoire of scaffolding strategies and primarily used translation. Their discomfort had two sources: worries about the learning curve for them to include language supports in content classes and concerns about the long-term learning of students. I discuss the two key findings that were evident through both cycles of inquiry. I conclude that teacher professional learning about the systematic use of translanguaging for use in content classes is necessary. In addition, if teachers are to take risks in changing practice, we need a clearer school-wide language policy about how to support English language learning in content classes.

Teacher Beliefs and Experiences Guided Practice

Almost the entire school community, from parents to teachers, are dual language learners, and everyone had views based on their personal experiences. The language of instruction is the

second language for many teachers and students. The teachers believe that they understood the student needs because they had had similar experiences. Those ideas guided their practice and dominated their choices—causing them to ignore research as a source of information about what to do. During CPR brainstorming discussions, teachers focused on what students needed, but they based decisions on their opinions and experiences. The teachers used common phrases in our conversations: "This is what I think." "Simplify the language; I have tried it." or "I don't believe this is right because I know these kids" (Teacher 1 and 2, CPR meeting, December 19, 2019 and January 16, 23, 2020). The teachers questioned the research during the CPR meetings; the pushback included comments about how "our students are different"; the CPR group said that they knew what was best for their kids because they had personal experience (Z. Hotaki, reflective memo, April 16, 2019). Thus, their beliefs dominated the conversations, and they did not appear open to changing based on research.

Secondly, concerns about student success informed their choices; the teachers were concerned that students would not be successful if they scaffold too much. Nonetheless, they relied mostly on shifting to explanations in Arabic, directly contradicting all these concerns, because it was simpler and required no preparation. Still, student needs and requests influenced the decisions they made in the midst of the lessons. During observations students would request, "Ms., can you explain that again in Arabic?" "Yanni, what does this mean?" or "Abla, can you translate that part real quick?" (Z. Hotaki, classroom observation, December 5 and 10, 2019, and January 9 and 15, 2020). The finding indicates that teacher beliefs and experiences were the primary elements in decisions about translation.

For both reasons, I recommend that we consider a concerted professional learning effort to understand the benefits of translanguaging. The professional learning could occur during our

summer institute before school starts with follow-up meetings throughout the year. The leadership can place the research findings in the MTSS framework as it naturally fits into the MTSS process of discussing students and interventions.

Translation as Scaffolding Support

Translation was the sole significant scaffolding support teachers used. One reason was that students requested translation more often. In every classroom observation, I witnessed a request for translation from students. Teachers were hesitant to plan to use translation because they believed that it was hard to shift back to English once they started translating. However, the teachers used translation because it was easiest and required no preparation. In addition, Arabic was the CPR teachers' mother tongue, and they felt more comfortable speaking it I use salient quotes from the evidence to introduce each reason.

"Once you move to Arabic, it is hard to move away from it."

During PAR Cycles One and Two, the teachers preferred translation as the translanguaging method that provided scaffolding support to students. However, the teachers did not have consistent plans in place to translate; instead, they translated as needed based on student requests because of their belief that "once you move to Arabic, it is hard to move away from it" (Teacher 1, CPR meeting October 17, 2019). The only planned scaffolding using the translanguaging approach to translate was a word wall. During our CPR discussion about translation, we discussed the importance of translating content in advance to solve the concern that the students would continue to use Arabic instead of English. Preparation in advance could limit the use of translation by focusing on specific translation areas such as terms or concepts for the unit of study.

For example, the teachers could have translated particular vocabulary or command terms alone and use English at all other times. Yet, because the preparation did not usually occur, they naturally shifted to Arabic when the first student requested more explanation or expressed a lack of understanding. Their inconsistent use of Arabic was in contrast to the student evidence that indicated choosing a specific scaffolding intervention and remaining consistent with the strategy could more effectively support students.

"When can this work get done?"

Secondly, teacher planning presented a roadblock; the teachers expressed discomfort about taking on complex strategies that required significant pre-planning, and they worried about long-term effects on student learning. What dominated their choices were key beliefs about the usefulness of translation and the dependence upon translation; the teacher choices originated from concerns about long-term student success and the teachers' experiences as second language learners. They believed other interventions would be best, and generally, the more limited the interventions in place, the better for the student (Teacher 2, CPR meeting, October 17, 2019). Yet, with all of these concerns, the translation used in all classes on an "at-needs" basis due to the lack of preparation time may have required more translation than if they had used specific methods. The episodic nature of the translation does not build student capacity in the content. Because they lacked the professional coaching that might have supported them to more fully understand the importance of the strategies for language learning, they fell back on the familiar.

"These are our kids and our language."

The teachers' levels of comfort while translating was another reason teachers used that as a scaffolding intervention. When students requested translation during the teaching of content and asked for the Arabic translations of subject-specific, the teachers would oblige. If students

needed more translation to explain content, the teachers would translate chunks of content in Arabic. Then, teachers would ask the students to write the Arabic word on task assignments or assessments after the teacher had said them in Arabic or written the words in Arabic on the board. However, while the method did not require much work from the teachers, the translation interrupted the lesson. They accommodated the students' request without considering what other strategies might be useful. The teachers had mastery of both the language and content, but the students cannot gain increased mastery without systematic efforts to connect first language to second language (Al Hosni, 2014).

In conclusion, the use of translation as the preferred scaffolding intervention was observed consistently in classroom observations and discussed during CPR meetings. I learned from PAR Cycles One and Two that changes in practice require more than research findings and professional development. Changing teachers' beliefs and practices requires collaboration and systematic professional learning sessions followed by observations in the classroom. Teachers' needed opportunities, supported throughout the school, to share practices, beliefs, and mental models in collaborative settings with coaches and leadership. We need to support teachers in better understanding how to change the beliefs around certain practices and move toward a model of teachers as practitioners and researchers. Otherwise, we will continue to allow personal beliefs and experiences to guide classroom practices. A more concerted approach to translanguaging requires a systems thinking approach.

Systems Thinking Approach

The organizational theory known as the "systems thinking model" helped me analyze the findings. Using this model, we see ourselves as organizational actors who have a broad view that includes structures, patterns, and events. In complex organizations such as schools, a systems

approach guides us to see the comprehensive picture as opposed to separate, unconnected events. As a leader, this organizational model helps me analyze problems and make complex tasks more manageable. This approach enabled me to see the bigger picture of the problem in the context of the school.

The systems thinking organizational theory helps me to understand ABP and the themes of teacher beliefs, scaffolding supports, and teacher consistency. ABP is a K–12 IB world school. The school is a complex organization because it is a private, dual language, IB school that is directly connected to an embassy. Leaders in an organization of this sort cannot look at the component parts but must understand the system as a whole; otherwise, we focus on specific events and miss the root cause of many issues. Senge (1990) says that it is important to look at the whole and find the underlying patterns to implement change and create impact properly. The organizational model is essential because when we can move away from simple parts and focus on the bigger picture, we can become

> a learning organization, where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together…. When organizations move focus away from events and patterns of behavior (which are symptoms of problems) and toward systemic structure and the underlying mental models, we can better learn and leverage for great impact. (p. 67)

Key Components of a Systems Thinking Model

First, I define a systems thinking model, and explain the core aspects of a learning organization. Then I apply the systems thinking model to the PAR context. I examine why this organizational model supports my deeper understanding of the factors that seemed to stymie

teachers from taking more systematic and research-based actions in the PAR. The organizational systems have a strong influence on the teachers' choices, which, in turn, strongly affected their willingness (or unwillingness) to shift their practices.

Overview of Systems Thinking

A systems thinking approach requires us to identify a system, describe the behavior or properties of the whole system, and explain the practices or features such as functions and roles. If used systematically, systems thinking provides a useful framework in a school analyze what is not working and to learn and grow. The model includes a collection of tools and methods to help organizations build capacity and solve problems. Conversely, knowledge of the ways systems thinking works offers an explanation of why systems restrain new thinking. Tools such as graphic organizers and dynamic thinking models to graph behavior are some examples of useful tools for supporting organizations to think about the different approaches to problems.

Using this organizational theory, I am more conscious of our actions and the role they play in the teachers' decisions. If people in organizations gain tools and experience in using the tools, they could be more nimble as organizational actors in diagnosing and designing new ways to address issues (Senge, 1990). However, without the mindset of learning from mistakes and what some term "failing forward," organizations typically remain stagnant. In the case of our school, the systems approach helped me explain why teachers were reluctant to experiment with new pedagogical choices.

Learning Organizations

In a systems thinking approach, learning organizations are organizations that defy the odds. Defying the odds means that the organization espouses and enacts a set of principles that encourage innovation and praxis (reflection to action) (Betts, 1992; Freire, 1970). Organizational

actors who engage in using tools to foster an open, generative system can re-imagine new ways of working together. In the case of schooling, teachers can re-imagine ways of teaching and learning that would lead to strong outcomes, and, specifically in this case, with a stronger systems approach, teachers might have had more support within the organization to experiment with scaffolding techniques.

According to Betts (1992), a learning organization is a system in which changes are necessary: (1) moving from a closed to open system, meaning the school needs more flexible structures or elements to reach the common students learning goals; (2) shifting from hierarchical to participative; (3) recognizing the multiple goals of schooling rather than "getting stuck" in a familiar paradigm or structure. Four systems thinking practices support a learning organization: shared vision, mental models, personal mastery, and team learning.

A shared vision is a necessary "vehicle for building shared meaning" (Senge, 1990, p. 298). Members of an organization need to co-construct the vision, which rests on shared purpose. If the vision is authentic and shared, everyone has a role to making this vision come to life.

- Mental models determine how organization actors act and react. They are generally tacit, and making those mental models explicit supports possible change in an organization. Being transparent and sharing the needs of the organization is part of reconsidering how mental models affect our ability to change.
- Personal mastery is the employees' focus on results and products. Part of achieving results is focusing on the process of how they got there. Personal mastery requires a belief in incremental change, and most of the change requires a shift in mental models as well as belief in the power of practice and iterative revision when taking on something new.

- Team learning occurs when the final product or result could not have been achieved individually, and the team is willing to shift their ideas and learn from each other. The entire process of systems thinking requires looking at patterns in an organization from a holistic perspective and making a collaborative commitment to change (Senge, 1990).

Applying Systems Thinking to ABP

Two key areas that could benefit our organization would be mental models and personal mastery. In other words, we need to better understand why we have certain perceptions about language learners and why the mental models often are negative and seem impervious to research knowledge. Because of mental models, the teachers did not venture into new practices or take risks to develop and implement new strategies; as a result, they limited their personal mastery as teachers.

Mental Models

In a diverse organization, mental models are a crucial component to understanding why individuals act or react in certain ways in an organization. The mental models are at the meso and micro levels. Secondly, the teachers have micro or classroom mental models that limit their capacity to teach all students.

The compartmentalized school structure at ABP is a major barrier that prevents different groups from working together. Every leader has an area of focus and often make decisions about a single aspect of the school without seeing how the shift might affect others. For example, teachers in the PAR project view their roles as content teachers and do not have a mental model of their roles as language teachers. While the leaders in the school could discuss the benefit of translanguaging, the school was not designed for sharing practice or supporting professional

learning that might influence teacher thinking and practices. This is termed this the “egg carton” school structure, which was cellular. However, that limits organizational productivity, innovation and collaboration. Because the mental models they had were not challenged systemically, they did not opt for changing practice or developing mastery of language learning within their content areas.

At the micro level where the teachers could exert some agency in decision-making about how to organize their classes, the mental models they had in place led to trusting current teacher beliefs in making scaffolding decisions. For example, math teachers focus on math content; the idea of teaching language for math teachers was a new concept. These mental models included their roles in helping learners and what support was considered part of their duties as teachers. In both cycles, the teacher actions revealed the importance of teacher beliefs and the role their beliefs play when deciding on the most successful methods to support dual language learners.

As I worked with the CPR group, I visited classes and had meetings with them individually and as a group. These helped me to understand better the importance of creating opportunities for teachers to share mental models in professional development. Their mental models included perceptions and beliefs that hindered them in using specific support systems because they believed certain things about the learners. During the CPR group meetings, they shared their mental models, including opinions about their students’ ability or motivation, for the first time. We used the models as our starting point for how we wanted to provide language support to the grade 10 learners. I more fully understood how teachers had developed mental models and how they were unable to attach to a stronger sense of personal mastery to support students. However, understanding systems thinking did not in the end lead to a changed system.

Personal Mastery

Senge (1990) says that we should not "shrink back from seeing the world as it is, even if it makes us uncomfortable" (p. 196). While the teachers recognized that the language learners were not fully successful, getting past their discomfort about change was difficult. Instead of committing to improving their teaching practices to adapt to learners, the teachers often generalized about student ability or student motivations and placed responsibility for change on students. I hoped that through recognizing the usefulness of approaching content through language scaffolding, they would shift their paradigms and see the value of new ways to engage students. However, they are not able to step back and understand the forest because they are only worried about the trees with which they were already familiar. When given opportunities, we still found that the forest was too large to approach; as we talked, they continued to focus on specific trees that might be closest to us or only trees that attract us the most. Being able to maneuver the forest is something that would benefit the overall community, but that did not occur.

The personal mastery issues applied to scaffolding choices and consistency. Many math and science teachers were not comfortable with language teaching, including methods and scaffolding supports that could be used to teach EL learners in math and science classes. The teachers rarely could imagine different scaffolding supports because they based their practices solely on their experiences.

Lack of interest in new learning and team learning was prominent. Understanding how to provide the support was key to the implementation process that could benefit the learners, and support from team members could have helped to build that confidence. However, content teachers were not focused on language results. They did not fully have the mental model that, for many dual language learners, language is part of everything they do and how they understand the

content. Team learning could be vital when we are looking at scaffolding techniques that work best. Moving from theory to successful practice requires teams to work and share collaboratively; however, that happened only intermittently.

During Cycle Two, the teachers were more consistent and with familiar scaffolding techniques. As they used these techniques, students were more successful and engaged. During classroom visits, students could make better connections when the teachers used consistent scaffolding techniques to support them. The scaffolding design could be used school-wide. Yet, the consistency occurred with one or two strategies, and teachers were reticent to experiment with others. They seemed to be comfortable at current level of personal mastery and did not challenge themselves to try new techniques.

There was limited movement on the use of scaffolding. However, I learned that mental models exert a strong influence on teacher decisions about taking professional risks. Thus, I needed to use the systems thinking process to ensure that we shift the compartmentalized school structure to a more collaborative structure. I saw that we needed meso level authorization and perhaps schoolwide professional learning so that teachers could learn about fusing content and language learning. I hope that they would feel more supported and knowledgeable about translanguaging and scaffolding and be more willing to shift mental models and practice and as a result experiment more systematically until they achieved new levels of personal mastery.

Implications

In this section, I explore how the data and findings answered the research questions and helped me better understand how my leadership developed during this process. I revisit the research questions and the theory of action. Then I discuss implications for leadership learning.

Implications for the PAR Research Questions

The overarching question is: How can the first language be used to scaffold second language acquisition and learning? Two sub-questions that guided the participatory action research are:

1. For Arabic-speaking students who are learning science and math in English, what pedagogical structures best support student learning?
2. To what extent does the professional development for teachers enable them to incorporate pedagogical structures that use the first language in assessments and lesson explanations to allow students to demonstrate learning in classes that are taught in English?

I have found that specific scaffolding techniques have positive results for learners when consistently used in math and science classes. The students' responses to scaffolding techniques indicated that both translation of subject-specific words/command terms/directions during assessment and also translation during the teaching of content supported their learning. Based on teacher and student feedback, we learned that the translation of words or concepts in the classroom by the teacher or sometimes students was the most beneficial technique. These two scaffolding techniques yielded the best results and were most often welcomed by learners.

Professional development is crucial for science and math teachers to learn to incorporate the right pedagogical structures in assessment and lessons. Yet, based on the evidence from the teachers, I discovered that professional development requires a dramatic modification. It must be school-wide, both to sanction the practices as an organization and to provide a larger context for the teachers to make decisions. While we used research, particularly in PAR Cycle One, as a basis for the decisions about scaffolding, teachers were unable to abandon their mental models

and take the professional risks to change practices. Professional development needed to be a part of a larger professional learning community and required more than a limited learning opportunity for developing research-based interventions. Because the school is generally atomized in its approach to coherency in teacher practices, teachers need more intentional professional learning and organizational sanction to step out of their current practices into new choices (Elmore, 2004).

Theory of Action

Our theory of action is that if teachers provide learners in math and science classes with tools using the first language, teachers will serve students more equitably. In the long term, we expected student learning in math and science content to improve. Teachers did gain some capacity in understanding that language learning is a part of all content classes. However, they did not gain substantial capacity for making different decisions based on research-based interventions.

However, we learned from PAR Cycles One and Two that with the proper tools teachers feel somewhat confident in their ability to support their learners. During the PAR Cycle Two, the teachers continued to reflect on their understandings of language learning, which initially they did not feel was their responsibility as science and math teachers. Nonetheless, their ability to reflect and feel some level of personal mastery with some basic scaffolding strategies is only the tip of the iceberg for fully addressing equity for all language learners.

Implications for Leadership

As I reflect on my leadership, I find that I have developed more empathetic responses as a listener and systems thinker. Working with teachers, I understand more completely why they practice the way do. Having difficult conversations about why some of their practices might be

more detrimental than helpful has forced me to listen before trying to come to conclusions of what teachers should be doing. Listening opportunities were not a part of any of my professional development plans before. I have realized that in all gatherings with teachers or at the start of any learning opportunity for teachers, it is critical to allow them to express their thoughts so that I as a leader have a better understanding of where the teachers are coming from. I focused less on specific actions and more on the process for why certain practices that are not beneficial remain popular among the teachers. This has been extremely important because it now allows me to understand better why specific beliefs about language learning are so engrained in science and math teachers.

I experienced frustration in the implementation process. I found that with the initial PAR Cycle One when the focus was on mental models and language theory, we focused on learning and understanding. With the Cycle Two focus on implementation, I was eager to ensure that we use the same scaffolding interventions that were discussed in CPR meetings. However, that expectation was unrealistic. Instead, I had to follow the thinking of the teachers. Discussions needed to happen during these times, and while they were never tricky conversations, they affected consistency and my overall collection of data. Yet, I realized that planning and implementation are not technical processes and do not occur as planned. The leader has to adapt to current situations and to the people who are responsible for the implementation. Despite how painfully slow the process seemed, I eventually realized that the teachers' beliefs influenced their practices more consistently than anything I proposed. We cannot overestimate the importance of systematic professional learning and school-wide authorization of risk-taking as a key proponent of change.

Conclusion

The PAR Cycle Two findings on using the first language to learn a second language are critical to understanding how change proceeds. The initial theme of teachers' beliefs around language started to emerge overwhelmingly in PAR Cycle Two. In the intersection of beliefs with the organizational theory of mental models, I found that theory cannot be separated from interventions that teachers are expected to put in place. In conclusion, our opinions explicitly or implicitly about our teaching are the primary force in teachers' decisions. Beliefs cannot be separated from theory or from practice.

The second theme of scaffolding support focused on translation as another overwhelming theme and finding consistent in all activities. The theme of teacher consistency is a weaker theme because I only have data to support it from PAR Cycle Two.

As to how to achieve better results, two key areas are: (1) focusing on consistency by providing space for teachers to share their mental models; and (2) providing more professional learning opportunities for non-language teachers to share their beliefs and practices about language learning. In Chapter 7, I analyze the findings and my overall work in the PAR project and study. In particular, I find that math and science teachers are removed from language discussions. This specific area is crucial and needs more practice-based research and professional learning in schools if we are to move language learning forward in an equitable way.

CHAPTER 7: DISCUSSION AND IMPLICATIONS

Learning a second language is an equity issue for many ELLs because schools too often focus on teaching the second language at the expense of the mother tongue. As both an educator and an ELL, I was interested in how schools could design more equitable approaches to teaching a second language through use of first-language skills. In the participatory action research (PAR) project and study, the CPR group and I focused on language development; specifically, we determined how using the mother tongue could support second language learning in the content areas of math and science. In exploring equitable teaching and learning opportunities for ELLs, we co-developed a tiered system in which the teachers provided language scaffolding and monitored how the scaffolding supported students' learning.

The participatory action research (PAR) theory of action was: if teachers provided learners in math and science classes with tools using the first language, the teachers could serve students more equitably. Over time, we expected student learning in math and science content to improve, and we expected that their use of their mother tongue would support learning English. My role as a coach was to support teacher practices in using research-based scaffolding practices for ELLs in the classes. The findings indicate that teachers were reluctant to fully embrace the use of scaffolding. Even when they did use some scaffolding and the students benefitted, they hesitated to go beyond the basic language supports. Because teachers relied on prior experience/beliefs to guide practices, they did not fully adopt research-based strategies and relied primarily on ad hoc translation.

Secondly, the teachers' concern for students' success was evident, but they also wanted to be seen as strong teachers in the school context. They hesitated to fully embrace the scaffolding systems, not only because they relied on past experience, but also because they

feared negative judgment given the perceived micropolitical context of the school. Thus, they were somewhat risk-adverse; they did not want to engage in practices that might seem too different and were not officially approved. Thus, to fully implement strategies that support ELLs, I recommend that the entire school needs to be involved in supporting policy and practice.

In discussing the findings through the lens of empirical and theoretical research, I revisit the research questions and frameworks discussed in Chapter 1. I consider the implications of the research and its contribution to policy and practice. Finally, I examine how the PAR project influenced me and my professional work as a leader and as a researcher.

Discussion

The PAR project results complement language learning theory and specifically that of translanguaging. When interventions to support English learning for Arabic-speakers are used the teacher is supporting the connections that are being made in the brain, these interventions actually support the connections that are needed for language acquisition in the brain (Garcia, 2009). In three areas of practice, the findings are relevant to the literature on language theory, language acquisition, and professional learning for teachers.

Language Theory

The dual-language approach to learning a second language is the most equitable and possibly the best method for acquiring a second language while maintaining the first. The newer term for using first language to access second language learning is "translanguaging," a framework for understanding bilingualism. In this approach, educators reframe bilingualism as a flexible linguistic activity intimately tied to different contexts (Hamman-Ortiz, 2019). The first language works with a second language holistically to support second language learning.

When working with the CPR group, one of the primary goals was to help the CPR understand that students are not switching from Arabic to English as quickly as they perceived. Furthermore, another important concept for the CPR to understand was that because different languages are not in siloed in the brain, thoughts and ideas overlap in both languages when a learner understands a concept. In other words, Arabic and English can work together to make meaning of the content taught and learned (Halasa & Al-Manaseer, 2012; Liu, 2008). Finally, translanguaging occurred in the classrooms as a last resort when students did not quite understand. As Elashhab (2020) found in her study of university science instruction, when classrooms teachers were more intentional about translanguaging use, their students were much better at learning complex content and concepts. In addition, Karlsson et al. (2019) found that students in grades 4-6 science classrooms related science concepts to practical experiences using their first language and then were better able to discuss the concept in their second language. The research confirms what we know about socio-cultural learning patterns that support student learning (Vygotsky, 1978); they are mediated through using prior understanding to support new understandings and better supported though social interaction among students.

Language Acquisition

We needed to understand the theory of language acquisition guide our design of the PAR project and evaluate its outcomes. Krashen (2003) explained that language acquisition best occurs in a natural, anxiety-free setting. He included the critical roles that inclusion and motivation play in second language learning.

Another form of acquisition is the bilingual approach in which language is learned by modeling the ways one learns a first language and transferring those methods to learning a second (Bleakley & Chin, 2004; Cummins, 2000; Fischer & Immordino-Yang, 2008; Krashan,

2003). García (2009) focuses on how language learning is more holistic and the each language is not known in isolation from each other, but work together in the mind to understand concepts and ideas. Translanguaging is similar to dual language learning in that it uses both languages in instruction. However, translanguaging offers a strategic way to blend both languages in the same setting or content area (Martínez et al., 2019); translanguaging can promote growth in the target language. All theories include transfer and memory to learn both the first and second language.

During the PAR cycles, the language acquisition method of using both languages simultaneously supported what I observed happening organically in the classroom. During classroom observations, students moved from Arabic to English frequently when expressing concepts that were difficult for them or for which they needed clarification. They asked each other for support, but the teachers often switched to Arabic to help students understand concepts; therefore, teaching and learning occurred in both languages. At times, there were no pauses in the shift from one language to another, and students could follow without difficulty when these transitions occurred; they interrupted the traditional English-only space to attempt to "normalize translanguaging use in their everyday expressions of bilingualism" (Martínez et al., 2019, p. 182). However, formalizing these informal practices was more complicated than I anticipated; teachers were not fully willing to build the supports into their daily lessons. Valenzuela (1999) calls what can occur "subtractive schooling" because it hampers second language learning, and teacher unwittingly contribute to the problem by not using scaffolding techniques. While they believe that they authentically care for students, in fact, they are practicing what Valenzuela calls "aesthetic caring" by adhering to policies and processes that do not work.

Professional Development for Math and Science Teachers

Professional development in language acquisition for math and science teachers was non-existent at our school; instead, the learning sessions concentrated on content and did not contemplate that all teachers would have a role in improving language skills. Thus, the teachers relied on professional experience and their experiences as English learners to guide them rather than research or professional literature. While there is considerable research on the strategies that teachers can use with ELLs in content areas, that did not persuade teachers to change (García, 2009; Janzen, 2008; Kim & Chang, 2010; Prochazkova, 2013).

We focused our professional learning on how math and science teachers could be more inclusive toward language learners to address the misconception that students who may not have mastered the language are behind in understanding the content. In fact, if they could have translation assistance to learn the concepts and content, they will keep up with the material in the second language. With the right scaffolding, learners can excel in the content though they might struggle with the language. While the CPR group used some of the methods in the classroom, most of them were not used consistently or even were rejected by the CPR group because they disagreed with them. The fallback strategy was translation rather than scaffolding. While translation can be beneficial for ELLs, a more thoughtful and planned approach is more valuable (Elashhab, 2020).

In summary, the planned scaffolding approaches did not occur during classroom observations. The CPR teachers used ad hoc translation when requested by students, and once the switch had occurred, it often continued for the rest of the class period. The CPR group asked the science and math teachers to learn more about different language learning opportunities to support students, but the teachers shied away from these research-based tools and reverted to

what they were most comfortable with on-the-spot translation. Their focus on professional learning requests had opportunities to make them feel more comfortable with having language learning be a part of their content material; they did not feel comfortable being language teachers; and they expressed concern about not having consistent professional learning schoolwide. Without a school policy and professional learning to support teachers in learning new practices, this small trial effort with two teachers was not as successful as I hoped. Finally, teachers were uneasy about the proposed innovations because they themselves were second language learners. During a CPR meeting with Teacher 2, she stated: "English is not my first language; I cannot just do some of these things because I do not understand them and will need to get good at them" (Teacher 2, check-in meeting, January 16, 2020).

We need to examine how teachers are adjusting to the students and support teachers to improve in the same way as we do for students. We will be unable to create appropriate professional development plans until we spend the necessary time understanding what they are comfortable with and why they practice the way they do. The PAR brought to light the importance of professional development pre-planning. This includes having a process to diagnose teacher readiness. What are some of their beliefs and understandings about their practices? Why do they practice the way they do? We may need to create specialized, tiered professional development or coaching opportunities for teachers based on this preliminary work. Schools need to support teachers to share and reflect on their practices. In addition, we needed more general authorization across the school for teachers to feel safe about trying new practices.

Response to Research Questions

The overarching research question was: How can the first language be used to scaffold second language acquisition and learning? The CPR group and I found that when the first

language was used to teach vocabulary, command terms, directions, and explain content, the students benefited greatly, and student assessment scores increased. While the translation of vocabulary, command terms, and directions for assignments was minimal, the ad hoc translation of content during the lecture was more frequent. Students found that the simple act of translation in any form was beneficial to their understanding of the content, and teachers found that overall student understanding increased when a systematic approach to translation was used even though the teachers did this minimally. The CPR agreed that a more systematic approach would have been beneficial as opposed to the ad hoc approach that they tried.

A PAR sub-question addressed Arabic-speaking students who are learning science and math in English and understanding what pedagogical structures could best support student learning. The CPR group and I found that in the PAR, the use and preparation of scaffolding interventions supported student learning. When teachers prepared to systematically translate specific areas with which learners struggled, such as subject-specific vocabulary, command terms, and directions/rubric, there was an impact on student understanding. The use of the first language to support learners to understand the content allowed them to use the second language in the class; they strengthened their use of the second language and their overall understanding of the content material.

The second sub-question for the PAR addressed the professional learning of teachers in incorporating pedagogical structures that use the first language in assessments and lesson explanation to allow students to demonstrate learning in classes taught in English. While professional development is essential and the CPR group at the start of the PAR process requested more of it, the research and professional learning on possibilities did not translate to use in the classroom. Their beliefs and prior experiences undermined their abilities to take on the

practices more consistently. Perhaps a more personalized coaching approach would benefit teaching in incorporating pedagogical structures; certainly, a schoolwide policy and professional learning opportunities could and should support that. Because teachers' beliefs outweighed other factors in their decisions, these beliefs and should be taken into account in creating personalized learning plans for teachers.

Equitable Learning Environments

The PAR focused on the importance of creating an equitable learning environment for second language learners by providing opportunities for them to use their mother tongue selectively in science and math studies. Three equity frameworks influenced the focus of practice (FoP): socio-cultural, psychological, and philosophical. The strongest influence came from the psychological framework.

After completing the FoP, I concluded that Steele's work on stigma threat was a strong theory and discussed it with the students and the CPR group. Underperformance occurs when individuals are made to feel excluded; the "not belonging" stigma leads them to underperform. Teachers often used terms to describe ELLs such as "lower," "not strong," and "weak" In their conversations and descriptions. These comments made students feel the only way they could learn the content in math or science was in the mother tongue; some students were utterly disengaged until the teacher spoke in Arabic.

I noted that this same stigma threat occurred with teachers. While the math and science teachers' felt confident of their mastery in their specific content area, they tended to rate themselves as not fully proficient in English or in language teaching, which influenced their decisions and led to resistance when asked to address language skills in their classes. Because

their mother tongue was not English, they felt unable to fully use specific language strategies to support their learners.

The concept of the racial contract addressed our unwillingness to address cultural diversity due to both our inability and our lack of power (Mills, 1997). The perspective in the school that the English language was more important than the mother tongue led many teachers, including dual language teachers, to feel they could sacrifice the first language in favor of English. They believed that English was superior in that it was an international language that would open the door to student success. One language dominated the other; the teachers and students who are the savviest in English are considered the best and brightest in the organization. This was a belief that teachers sometimes openly shared in CPR meetings, and that belief influenced the teachers' practices. If not addressed, this is an issue of inequality in the classroom and learning environment that will continue to have negative ramifications.

The socio-cultural framework is relevant to the FoP in language learning because language connects learners to moral, values, culture, and social practices. When studying a language, students learn about its literature and social and cultural aspects of the author's time. Language learning inevitably incorporates a humanist approach, but Gutiérrez (2016) believes a similar humanist lens is vital to the learning of science as well. For this reason, the mother tongue and socio-cultural aspects should not be sacrificed even in science and math classrooms that are more content-driven, less culturally bound subjects. When language learning intersects with technical content, teachers are less likely to see the importance of retaining a socio-cultural point of view.

The PAR brought light to an issue common to many schools—our attention to equity for students should also apply to teachers. The pitfalls that teachers face with language use as ELLs

are the same that language teachers use when talking about their own language ability. The idea that teachers are considered "lower functioning" at certain things because they lack the same language strength as other teachers leads to the same attitudes in the classroom with students.

Implications

The PAR goal was to develop a school culture in which educators do not see the first language as a barrier but an asset; we do not want learners to sacrifice the first language to learn a second, and we do not want teachers who are also ELLs to sacrifice their language to the dominant cultural norms. A dual-language approach is the most beneficial and equitable approach to learners. Both global evidence and the current theory on translanguaging support the needs of a mother tongue-based education (Trudell, 2016). As I discuss implications of the PAR, I support improving teacher practices based on research that becomes a part of school policies.

Language Teaching Practice

One important learning during PAR Cycles One and Two was that change in practice required more than research-informed professional development. Change is hard for practitioners, and many of their practices are based on their prior experiences and beliefs about learning. Changing these beliefs and practices requires collaboration and learning in the classroom with students and not just in meetings. When scaffolding for learning and support are not strong, teachers practice some interventions that are easy for them—practices that require minimal preparation and do not disturb the teacher's current comfort level.

Thus, educational leaders must understand that professional development must include opportunities for teachers to share practices, beliefs, and mental models. This study demonstrates that the mental models and beliefs drive practice and are significant motivators for why teachers practice the way they do. I would redefine professional learning communities to focus on finding

research-based practices that could benefit teachers and are organized as smaller, intimate, and ongoing learning opportunities.

Local Policy

The results of the PAR can inform educational policy at the local level. In theory, no school district is trying to strip the first language of a learner. Unfortunately, language learning in schools unconsciously creates a culture of good and bad language. The first language is considered a barrier instead of an asset to learn a second language. For example, at the district level, school and district leaders support teachers to understand better what a dual language approach is, how translanguaging is different than simply code-switching, and how research demonstrates that learners improve academically using both languages. At the local school and district level, we need to promote policies that change our approach and implementation in the classroom.

Research

Language theory and acquisition is reliable and supports the PAR study. This study contributed to our understanding of the barriers to implementing what we know works. While researchers have found many useful practices that use scaffolding to teaching language across the curriculum, teachers were reluctant to use them because of their beliefs and prior experiences as teachers and as second language learners themselves.

Knowing that these barriers exist at local levels is a key finding; teachers must be persuaded that research findings, no matter how compelling, are applicable to their own circumstances and capacities. Therefore, more studies in local contexts in different settings with teachers who are second language learners would be helpful in understanding how we can shift beliefs into different practices. While we often accept the Elmore (2002) framing that if "we grab

people by their practice, their hearts and minds will follow" (p. 4), this research confirms that practice ideas alone do not change beliefs. We need more insight into how beliefs influence teacher choices more than professional learning about effective practices. As Parajes (1992) said nearly 30 years ago, research on teacher beliefs requires "clear conceptualizations, careful examination of key assumptions, consistent understandings and adherence to precise meanings, and proper assessment and investigation of specific belief constructs" (p. 306). What does space to share beliefs/ideas look like, and when/how would administrators get personal beliefs or mental model information from faculty members?

Limitations and Considerations

The primary limitation of the PAR is the school setting in which the dual language teachers share the language of the learners. One of this school's great benefits is that more than half of the faculty share the same mother tongue as the students. In theory, this should have facilitated implementation of the mother tongue scaffolding techniques during PAR Cycle One and Two. Transferring this type of study to a multi-language environment or one in which the teacher does not speak the first language of the students would be more difficult. However, some of the strategies that are available speak to this dilemma. If teachers did not have the advantage of sharing a language with students, they might be more willing to try other methods.

A second limitation is the size of the study. I focused on the practices of just two second-language-learner science and math teachers whose students' first language is Arabic. Thus, the qualitative results are not generalizable, but a similar study could be conducted in different contexts using the same participatory action research methodology.

Some emerging questions address the role of professional development for science and math teachers. Working closely with the CPR group and focusing on their specific needs and

those of the learners contributed to the success of the scaffolding interventions. Smaller professional development opportunities would be the best method to discuss the teacher mental models that were an obstacle to the scaffolding interventions.

An "aha" moment during Cycle Two was the need for teachers to have opportunities and spaces to share their beliefs about their practices. Professional learning communities were initially designed for this purpose. However, they rarely fulfill this potential as there is limited time for teachers to share peer practices and beliefs in spaces in which they do not feel judged. A more consistent approach to communities of practice that draws on their funds of knowledge would allow them to share and learn from peers and reflect consistently on who they are as teachers and why they do what they do (Lave & Wenger, 1991; Moll et al., 1992). While that might not lead to the desired changes immediately, the practice of teachers deciding about their work and their learning from the inside out is critical for lasting change (Grubb & Tredway, 2010).

Leadership Development

When I first started working with the CPR group, I came to the study with some degree of authority and power because I had been a curriculum coordinator and knew the research literature. While these are critical tools, they do not define leadership. Having the right answers and research to back up your ideas does not mean anyone will follow and make the necessary changes. The PAR taught me that mobilizing people to tackle tough challenges and thrive is risky work. Having authority did not matter because leadership differs from authority. In the PAR Cycles, I learned that the CPR group needs to believe in the work, and while they agreed to be part of the PAR and wished to support EL learners with scaffolding interventions, they had to

want to change their practices. I realized quickly that many people believe in things, but to change who they are to match beliefs is a whole different story.

Over the summer and during PAR Cycle One, our focus was on community learning exchanges; we did a gallery walk, had Socratic seminars during PD, and did a lot of dissecting of the research. They were open to all these discussions, and we were excited to be part of the PAR. When we started to talk about interventions and what we could implement, my role required a lot more collaboration and listening. Before the CPR group meetings, I had to always think of a strategy for introducing our plan for the coming weeks. I had to be prepared to hear what they wanted to focus on, and I had to be patient when they would air their frustrations.

At first, I took their pushback personally. Leading can be lonely, and when people pushback, it can make it that much more difficult (Z. Hotaki, reflective memo, December 15, 2020). Yet, pushback is not always a bad thing. I learned that the pushback was not personal. It was based on the CPR teachers' discomfort levels with the scaffolding techniques. I knew that leading others in this work requires us to try experiments and look for discoveries and modify "how we do business." It also requires new values, attitudes, and behaviors. It requires people to give up the mask of consistency for something they have never experienced.

The PAR taught me about change—to ask people to change a fundamental part of themselves, their beliefs, practices, and a traditional way of doing business is not an easy task. Feelings of anger, disappointment, and sadness were a part of the process. While these were not the only emotions, they stood out and became barriers to the work. I have developed empathy and listening skills and know that while authority and research are important as hard skills for the job of leading, the perceived soft skills of empathy and listening are the real skills needed to create more equitable learning environments (Senge et al., 1994).

Researcher-Practitioner

When reflecting on my PAR research journey, I have found my research identity changed depending on my school role. My position as a leader in learning has forced me to move toward being a more data- and research-driven practitioner. As a teacher, I found innovative methods and practices that focused on my specific class and looked less at generalizations but more on my students' case-by-case situations. As my education role changed to leading a school, I realized that I needed to examine research and generalizations that benefit an entire community and support the teachers to take that research and customize it to fit classes.

My current identity in this PAR study has shifted from a school leader in a school environment to a researcher. This requires a significant shift in how I, as a practitioner, seek out and interpret research compared to how I, as a researcher, would do the same. I have been able to move from "find research that supports what I am doing that is working" to "look at possible problems in my setting and find research and tweak it for actual practice and implementation in the classroom." It is most challenging for educators who are full-time practitioners and want to engage more in research because, unlike in many fields, we have years of tried and practiced theory. It is hard to get rid of those ideas when you are researching. It is easy to fall into looking for research that defends what you are already doing. This PAR study has given me a better understanding of seeking out and applying scientific research as an educator, to move away from a trial-and-error practice to a more scientific approach incorporating information that allows for less error.

Conclusion

I have both experienced and learned that the language learning arena is political. Many learners worldwide believe that a quality education can only come with specific languages and

have veered toward sacrificing the mother tongue to adopt one of these international languages. Yet, learning concepts can be achieved successfully when learned in the mother tongue. To improve learners' quality of education and keep them connected to their culture, history, and religion, it is imperative that the mother tongue not be sacrificed for a second language. While learning some languages such as English undoubtedly opens the door to jobs and further education, learners cannot do it at the expense of the mother tongue, not just for socio-cultural and equity reasons, but because learning outcomes are improved when the mother tongue remains intact. Learners can use the mother tongue to scaffold second language learning, and schools can find a healthy middle ground to support learners and make them feel that their languages are as prestigious as the second language they are trying to learn. This shift in thinking will allow them to develop a positive mindset and understand that their mother tongue is not a barrier but an asset.

REFERENCES

Abedi, J., Hofstetter, C., & Lord, C. (2004). Assessment accommodations for English language learners: Implications for policy-based empirical research. *Review of Educational Research, 74*(1), 1–28.

Alfares, N. (2017). Benefits and difficulties of learning in group work in EFL classes in Saudi. *English Language Teaching*, *10*(7), 247–256.

Alghofaili, M. N., & Elyas, T. (2017). Decoding the myths of the native and non-native English speakers teachers (NESTs & NNESTs) on Saudi EFL tertiary students. *English Language Teaching, 10*(6), 1–11.

Al Hosni, S. (2014). Speaking difficulties encountered by young EFL learners. *International Journal on Studies in English Language and Literature, 2*(6), 22–30.

Alizadeh, M. (2016). The impact of motivation on English language learning. *International Journal of Research in English Education*, *1*(1), 11–15.

Ashton, P. T., & Webb, R. B. (1986). *Making a difference: Teachers' sense of efficacy and student achievement*. Longman.

Baker, L. I. (2017). What it takes to succeed: The importance of social support for academically successful middle school English learners. *Youth & Society*, *49*(5), 658–678.

Ball, S. J., & Lacey, C. (2012). *Subject disciplines as the opportunity for group action: A measured critique of subject sub-cultures.* Routledge.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. W. H. Freeman and Company.

Betts, F. (1992). How systems thinking applies to education. *Educational Leadership, 50*(3)*,* 38–41.

Bleakley, H., & Chin, A. (2004). Language skills and earnings: Evidence from childhood immigrants. *The Review of Economics and Statistics*, *86*(2), 481–496.

Bransford, J. D., & Schwarz, D. (1999). Rethinking transfer: A simple proposal with multiple implications. *Review of Research in Education, 24*(6), 61–100.

Bryk, A., Gomez, L., Grunow, A., & LaMahieu, P. (2015). *Learning to improve: How America's schools can get better at getting better*. Harvard Education Press.

Burns, F., & Rico, M. (2018). Attribution theories in language learning motivation: Success in vocational English for hospitality students. *English Language Teaching*, *11*(11), 44.

Byrnes, J. P. (2007). *Cognitive development and learning in instructional contexts* (3rd ed.). Allyn & Bacon.

Callahan, R. M., & Shifrer, D. (2016). Equitable access for secondary English learner students: Course taking as evidence of EL program effectiveness. *Educational administration quarterly: EAQ*, *52*(3), 463–496.

Chamot, A., & O'Malley, M. (1994). *The CALLA handbook: Implementing the cognitive academic language learning approach.* Addison-Wesley.

Chan, S., Raoofi, S., & Tan, B. (2012). Self-efficacy in second/foreign language learning context. *English Language Teaching, 5*(11).

Creswell, J. W., & Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). Sage.

Creswell, J., & Guetterman, T. (2018). *Educational research* (6th ed.). Pearson.

Cuban, L. (1993). *How teachers taught: Constancy and change in American classrooms 1890-1990*. Pearson.

Cummins, J. (2000). *Language, power and pedagogy: Bilingual children in the crossfire.* Multilingual Matters.

DeJesus, S. C. (2008). An astounding treasure: Dual language education in a public school setting. *Centro Journal*, *20*(2), 192–217.

Donohoo, J., Hattie, J., & Eells, R. (2018). The power of collective efficacy. *Educational Leadership, 75*(6), 40–44.

Elashhab, S. (2020). The impact of translanguaging on the EFL competence development of Arabic-speaking learners. *Asian EFL Journal*, *37*(3.1), 393–413.

Elmore, R. (2002). *The limits of "change"*. Harvard Education Letter: Research Online. https://theywilllearn.files.wordpress.com/2010/02/limits_change11.pdf

Elmore, R. F. (2004). *School reform from the inside out: Policy, practice and performance.* Harvard Education Press.

Fischer, K., & Immordino-Yang, M. E. (2008). *Jossey-Bass reader on learning and the brain.* John Wiley & Sons, Inc.

Freire, P. (1970). *The pedagogy of the oppressed.* Continuum.

Fullan, M. (1993). *Change forces: Probing the depths of educational reform*. Falmer Press.

García, O. (2009). *Bilingual education in the 21st century: A global perspective.* Wiley/Blackwell.

Gardner, R. C. (1985). *Social psychology and second language learning: The role of attitudes and motivation.* Edward Arnold.

Gardner, R., Tremblay, P., & Masgoret, A. (1997). Towards a full model of second language learning: An empirical investigation. *The Modern Language Journal, 81*(3), 344–362.

Goddard, R. D. (2002). A theoretical and empirical analysis of the measurement of collective efficacy: The development of a short form. *Educational and Psychological Measurement*, *62*(1), 97–110.

Grubb, W. N., & Tredway, L. (2010). *Leading from the inside out: Expanded roles of teachers in equitable schools.* Paradigm Press.

Guajardo, M., Guajardo, F., Janson, C., & Militello, M. (2016). *Reframing community partnerships in education: Uniting the power of place and wisdom of people.* Routledge.

Gutiérrez, C. (2016). Designing resilient ecologies: Designing social experiments and a new social imagination. *Educational Researcher, 45*(3), 187–196.

Halasa, N. H., & Al-Manaseer, M. (2012). The use of the first language in second language learning reconsidered. *College Student Journal*, *46*(1), 71–81.

Hamman-Ortiz, L. (2019). Unpacking translanguaging. *Educational Leadership, 77*(4), 64–66.

Hammond, Z. (2014). *Culturally responsive teaching and the brain: Promoting authentic engagement and rigor among culturally and linguistically diverse students.* Corwin and Company.

Hao, M., & Yazdanifard, R., (2015). Effective leadership can facilitate change in organizations through improvement and innovation. *Global Journal Of Management and Business Research: Administration and Management, 15(*8), 88–92.

Hargreaves, A., & Fullan, M. (2012). *Professional capital: Transforming teaching in every school*. Teachers College Press.

Hart, J., & Lee, O. (2003). Teacher professional development to improve the science and literacy achievement of English language learners. *Bilingual Research Journal, 27*(3), 89–97.

Hunter, L., Emerald, E., & Martin, G. (2013). *Participatory activist research in the globalized world*. Springer.

Janzen, J. (2008). Teaching English language learners in the content areas. *Review of Educational Research, 78*(4), 1010–1038.

JohnBull, R. M., Hardiman, M., & Rinne, L. (2013). *Professional development effects on teacher efficacy: Exploring how knowledge of neuro- and cognitive sciences changes beliefs and practices*. Corwin.

Johnson, K. (2015). Reclaiming the relevance of L2 teacher education. *The Modern Language Journal, 99*(3), 515–528.

Karlsson, A., Larsson, P. N., & Jakobsson, A. (2019). Multilingual students' use of translanguaging in science classrooms, *International Journal of Science Education, 41*(15), 34–42.

Kim, S., & Chang, M. (2010). Computer games for the math achievement of diverse students. *Journal of Educational Technology & Society, 13*(3), 224–232.

Krashen, S. (1981). *Second language acquisition and second language learning*. Pergamon.

Krashen, S. (1996). The case for narrow listening. *System, 1*(24), 97–100.

Krashen, S. (2003). *Explorations in language acquisition and use: The Taipei lectures.* Heinemann.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation.* Cambridge University Press.

Lee, O. (2005). Science education with English language learners: Synthesis and research agenda. *Review of Educational Research, 75*(4), 491–530.

Lincoln, Y., & Guba, E. (1985). *Naturalistic inquiry*. Sage Publications.

Liu, J. (2008). L1 use in L2 vocabulary learning: Facilitator or barrier. *International Education Studies, 1*(2), 65–69.

Long, S. S., Derby, L., Scharff, L., LeLoup, J. W., & Uribe, D. (2015). Leadership development and language learning: A foundational framework. *Dimension*, 34–49.

Margolis, J. (2012). Hybrid teacher leaders and the new professional development ecology. *Professional Development in Education, 38*(3), 291–315.

Martinéz, A., Hikida, M., & Durán, L. (2019). Translanguaging and the transformation of classroom space. In M. Pacheco, P. Zidali Morales, & C. Hamilton (Eds.), *Transforming schooling for second language learners: Theoretical insights, policies, pedagogies, and practices* (pp. 181-198).

Militello, M., Rallis, S., & Goldring, E., (2009). *Leading with inquiry and action: How principals improve teaching and learning community-based*. Corwin Press.

Mills, C. (1997). *The racial contract.* Cornell University Press.

Moll, L., Amanti, C., Neff, D., & Gonzalez, N. (1992). Funds of knowledge for teaching: Using a qualitative approach to connect homes and classrooms. *Theory into Practice, 31*(2), 131–141.

Muijs, D., & Harris, A. (2003). Teacher leadership—Improvement through empowerment? An overview of the literature. *Educational Management Administration & Leadership, 31*(5), 437–448.

Ng, C., & Ng, P. (2015). A review of intrinsic and extrinsic motivations of ESL learners. *International Journal of Languages, Literature and Linguistics*, *1*(2), 98–105.

Oxford, R., & Shearin, J. (1994). Language learning motivation: Expanding the theoretical framework. *The Modern Language Journal, 78*(1), 12–28.

Parajes, M. F. (1992). Teachers' beliefs and education research: Cleaning up a messy construct. *Review of Educational Research, 63*(3), 307–332.

Park, G. (1997). Language learning strategies and English proficiency in Korean university students. *Foreign Language Annals, 30*(2), 211-221.

Piaget, J., & Cook, M. T. (1952). *The origins of intelligence in children*. International University Press.

Prochazkova, L. (2013). Mathematics for language, language for mathematics. *European Journal of Science and Mathematics Education, 1*(1), 23–28.

Root, E. (2013). *Motivation and learning strategies in a foreign language setting: A look at a learner of Korean.* University of Minnesota Press.

Rosenthal, L. (2019). *Fits and starts: One elementary school's journey toward trauma-informed leadership*. (Unpublished doctoral dissertation). East Carolina University.

Saffran, J. R., Senghas, A., & Trueswell, J. C. (2001). The acquisition of language. *National Academy of Sciences, 98*(23), 74–75.

Saldaña, J. (2016). *The coding manual for qualitative researchers*. Sage.

Senge, P. (1990). *The fifth discipline: The art and practice of the learning organization.* Doubleday.

Senge, P., Roberts, C., Ross, R. B., Smith, B. J., & Kliener, A. (1994). *The Fifth Discipline Fieldbook: Strategies and tools for building as learning organization.* Doubleday.

Short, D., & Fitzsimmons, S. (2007). *Double the work: Challenges and solutions to acquiring language and academic literacy for adolescent English language learners.* Alliance for Excellent Education.

Slavin, R. E. (2013). *Cooperative learning: Theory, Research, and Practice* (2nd ed.). Allyn and Bacon.

Sorenson, T., & Paradis, J. (2016). English language learners' nonword repetition performance: The influence of age, L2 vocabulary size, length of L2 exposure, and L1 phonology. *Journal of Speech, Language & Hearing Research*, *59*(1), 39–48.

Steele, C. (2010). *Whistling Vivaldi: And other clues to how stereotypes affect us.* W. W. Norton & Company.

Swinton, A. D., Kurtz-Costes, B., Rowley, S. J., & Okeke-Adeyanju, N. (2011). A longitudinal examination of African American adolescents' attributions about achievement outcomes. *Child development*, *82*(5), 1,486–1,500.

Tan, M. (2011). Mathematics and science teachers' beliefs and practices regarding the teaching of language in content learning. *Language Teaching Research*, *15*(3), 325–342.

Tredway, L. (2019). *Observing for equity toolkit*. Unpublished manuscript.

Trudell, B. (2016). The image of language policy and practice on children's learning: Evidence from Eastern and Southern Africa. UNICEF.

Tum, D. (2015). Foreign language anxiety's forgotten study: The case of the anxious preservice teacher. *TESOL Quarterly, 49*(4), 627–658.

Valenzuela, A. (1999). *Subtractive schooling: U.S.-Mexican youth and the politics of caring.* State University of New York Press.

Vihman, M. M. (2017). Learning words and learning sounds: Advances in language development. *British Journal of Psychology, 108*(1), 1–27.

Vygotsky, L. (1978). Interaction between learning and development. *Mind and Society*, *34*(6), 79–91.

Walling, M. D., & Martinek, T. J. (1995). Learned helplessness: A case study of a middle school student. *Journal of Teaching in Physical Education, 14*(4), 454–466.

Wang, Y., & Garigliano, R. (1995). Empirical studies and intelligent language tutoring. *Instructional Science, 23*(13), 47–64.

Wei, L. (2014). *Translanguaging: Language, bilingualism and education.* Palgrave Macmillan Pivot.

Weiner, B. (1972). Attribution theory, achievement motivation, and the educational process. *Review of Educational Research*, *42*(2), 203–215.

Wenner, J. A., & Campbell, T. (2017). The theoretical and empirical basis of teacher leadership: A review of the literature. *Review of Educational Research*, *87*(1), 134–171.

Werker, J. F., & Tees, R. C. (1984). Cross-language speech perception: Evidence for perceptual reorganization during the first year of life. *Infant Behavior & Development, 7*(1), 49–63.

York-Barr, J., & Duke, K. (2004). What do we know about teacher leadership? Findings from two decades of scholarship. *Review of Educational Research, 74*(3), 255–316.

Yuan, B., & Zhao, Y. (2005). Resumptive pronouns in English-Chinese and Arabic-Chinese interlanguages. *International Review of Applied Linguistics in Language Teaching (IRAL), 43*(3), 219–237.

APPENDIX A: INSTITUTIONAL REVIEW BOARD APPROVAL

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board
4N-64 Brody Medical Sciences Building· Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office **252-744-2914** · Fax **252-744-2284** ·
rede.ecu.edu/umcirb/

Notification of Initial Approval: Expedited

From: Social/Behavioral IRB
To: Zarmina Hotaki
CC: Matthew Militello
Date: 9/13/2019
Re: UMCIRB 19-001615
Dual Language Learning

I am pleased to inform you that your Expedited Application was approved. Approval of the study and any consent form(s) occurred on 9/12/2019. The research study is eligible for review under expedited category # 6, 7. The Chairperson (or designee) deemed this study no more than minimal risk.

Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a Final Report application to the UMCIRB prior to the Expected End Date provided in the IRB application. If the study is not completed by this date, an Amendment will need to be submitted to extend the Expected End Date. The Investigator must adhere to all reporting requirements for this study.

Approved consent documents with the IRB approval date stamped on the document should be used to consent participants (consent documents with the IRB approval date stamp are found under the Documents tab in the study workspace).

The approval includes the following items:

Name	Description
Consent Form	Consent Forms
Interview Protocol	Interview/Focus Group Scripts/Questions
Observation Protocol	Interview/Focus Group Scripts/Questions
Paper Proposal	Study Protocol or Grant Application

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

APPENDIX B: SCHOOL LETTER

[redacted]

May 1, 2019

To Whom It May Concern:

[redacted] recognizes the benefits of participating in relevant, well-designed research studies proposed by qualified individuals. Approval for conducting such studies is based primarily on the extent to which substantial benefits can be shown for [redacted] Academy and its mission of educating students. The purpose of this letter is to notify you of the **approval** to use conduct Zarmina Hotaki's dissertation study titled, "DUAL LANGUAGE LEARNING: HOW CAN FIRST LANGUAGE USE BE USED TO SCAFFOLD SECOND LANGUAGE ACQUISITION AND LEARNING" with participants in our school. We also give permission to utilize the following spaces at [redacted] Academy to collect data and conduct interviews for his dissertation project: English, math and Science classes, teachers and students.

The project meets all of our school/district guidelines, procedures, and safeguards for conducting research on our campus. Moreover, there is ample space for Zarmina Hotaki to conduct her study and her project will not interfere with any functions of [redacted] Academy. Finally, the following conditions must be met, as agreed upon by the researchers and [redacted]

- Participant data only includes information captured from the state data collection strategies.
- Participation is voluntary.
- Participants can choose to leave the study without penalty at any time.
- Any issues with participation in the study are reported to the school administration in a timely manner.
- An executive summary of your findings is shared with the school administration once the study is complete.

In addition to these conditions, the study must follow all of the East Carolina University IRB guidelines.

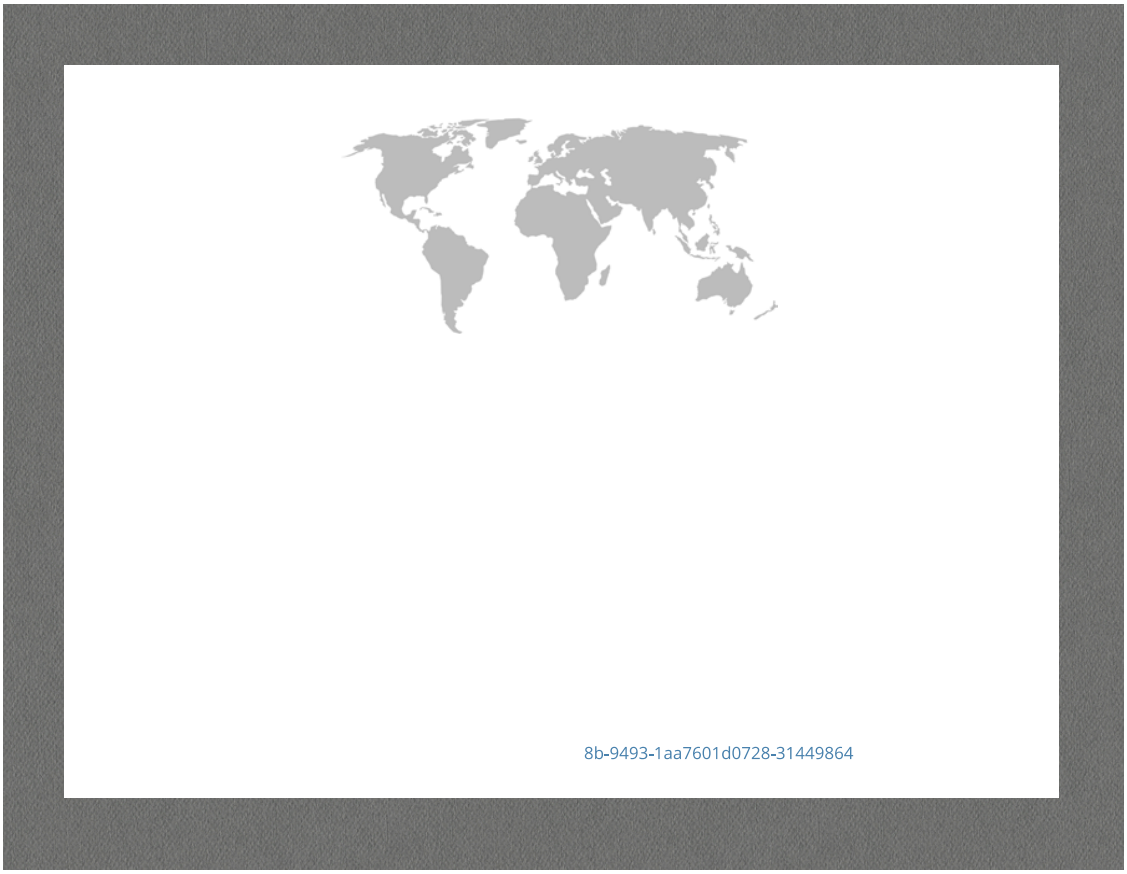
We are excited to support this important work.

Respectfully,

[redacted]

[redacted]

APPENDIX C: CITI CERTIFICATION



8b-9493-1aa7601d0728-31449864

APPENDIX D: ADULT CONSENT FORM

Informed Consent to Participate in Research

Information to consider before taking part in research that has no more than minimal risk.

Title of Research Study: Dual Language Learning: How can the first language be used to scaffold second language acquisition and learning?

Principal Investigator: Zarmina Hotaki with Faculty Supervisor Dr. Matthew Militello
Dr. Militello: Institution, Department or Division: College of Education
Address: 220 Ragsdale, ECU, Greenville, NC 27858
Telephone #: (919) 518.4008

Researchers at East Carolina University (ECU) study issues related to society, health problems, environmental problems, behavior problems and the human condition. To do this, we need the help of volunteers who are willing to take part in research.

Why am I being invited to take part in this research?
The purpose of this research is to better understand how educators can support learners who are learning a second language in math and science classes. You are being invited to take part in this research because you are a math/science teacher at the school or an administrator that supports learners in this school environment. The decision to take part in this research is yours to make. By doing this research, we hope to learn how to better provide the most equitable learning environment for second language learners specifically in math and science classes.

Are there reasons I should not take part in this research?
There are no known reasons for why you should not participate in this research study.

What other choices do I have if I do not take part in this research?
You can choose not to participate.

Where is the research going to take place and how long will it last?
The research will be conducted at your school. The total amount of time you will be asked to volunteer for this study is approximately 8 hours total.

What will I be asked to do?
If you agree to participate in this study, you may be asked to participate in two interviews and focus groups. Interviews and focus groups will be audio recorded. If you want to participate in an interview but do not want to be audio recorded, the interviewer will turn off the audio recorder. Interview and focus group questions will focus on your reflections and experiences in Community Learning Exchanges. You will be asked to make some changes to assessments and teaching techniques that include translating command terms on exams, and translating subject specific vocabulary.

What might I experience if I take part in the research?
We do not know of any risks (the chance of harm) associated with this research. Any risks that may occur with this research are no more than what you would experience in everyday life. We do not know if you will benefit from taking part in this study. There may not be any personal benefit to you but the information gained by doing this research may help others in the future.

Will I be paid for taking part in this research?
We will not be able to pay you for the time you volunteer while being in this study.

Will it cost me to take part in this research?
It will not cost you any money to be part of the research.

Who will know that I took part in this research and learn personal information about me?
ECU and the people and organizations listed below may know that you took part in this research and may see information about you that is normally kept private. With your permission, these people may use your private information to do this research:

- Any agency of the federal, state, or local government that regulates human research. This includes the Department of Health and Human Services (DHHS), the North Carolina Department of Health, and the Office for Human Research Protections.
- The University & Medical Center Institutional Review Board (UMCIRB) and its staff have responsibility for overseeing your welfare during this research and may need to see research records that identify you.

How will you keep the information you collect about me secure? How long will you keep it?
The information in the study will be kept confidential to the full extent allowed by law. Confidentiality will be maintained throughout the data collection and data analysis process. Consent forms and data from interviews will be maintained in a secure, locked location and will be stored for a minimum of three years after completion of the study. No reference will be made in oral or written reports that could link you to the study.

What if I decide I don't want to continue in this research?
You can stop at any time after it has already started. There will be no consequences if you stop and you will not be criticized. You will not lose any benefits that you normally receive.

Who should I contact if I have questions?
The people conducting this study will be able to answer any questions concerning this research, now or in the future. You may contact the Principal Investigator via email at zhotaki1@ecu.edu or by phone at 703-420-0251 from 7:00 am to 4:00 pm Monday-Friday.

If you have questions about your rights as someone taking part in research, you may call the Office of Research Integrity & Compliance (ORIC) at phone number 252-744-2914 (days, 8:00 am-5:00 pm). If you would like to report a complaint or concern about this research study, you may call the Director for Human Research Protections, at 252-744-2914.

Is there anything else I should know?
Your information collected as part of the research, even if identifiers are removed, will not be used or distributed for future studies.

I have decided I want to take part in this research. What should I do now?

The person obtaining informed consent will ask you to read the following and if you agree, you should sign this form:

- I have read (or had read to me) all of the above information.
- I have had an opportunity to ask questions about things in this research I did not understand and have received satisfactory answers.
- I know that I can stop taking part in this study at any time.
- By signing this informed consent form, I am not giving up any of my rights.
- I have been given a copy of this consent document, and it is mine to keep.

_____

Participant's Name (PRINT) **Signature** **Date**

Person Obtaining Informed Consent: I have conducted the initial informed consent process. I have orally reviewed the contents of the consent document with the person who has signed above, and answered all of the person's questions about the research.

_____

Person Obtaining Consent (PRINT) **Signature** **Date**

APPENDIX E: OBSERVATION NOTES

Observer: _____

Observation Notes

Date	
School	
Time	
Observation (Teacher or Meeting) [CODE]	

Time	Selective Verbatim Notes of Observation	Annotations and Codes

APPENDIX F: INTERVIEW PROTOCOL

Dual Language Learning: How can the first language be used to scaffold second language acquisition and learning?

Introduction

Thank you for taking time from your busy schedules to meet with me today. I appreciate your willingness to participate in this focus group interview and will limit the time thirty minutes.

My name is Zarmina Hotaki. I will serve as the moderator for the interview. I am conducting research as a graduate student at East Carolina University. The interview is part of a study to find equitable support options for second language learners. We will focus on how we can use the first language to scaffold second language acquisition and learning.

Disclosures:

- Your participation in the study is voluntary. It is your decision whether or not to participate and you may elect to stop participating in the interview at any time.
- The interview will be recorded in order to capture a comprehensive record of our conversation. All information collected will be kept confidential. Any information collected during the session that may identify any participant will only be disclosed with your prior permission. A coding system will be used in the management and analysis of the focus group data with no names or school identifiers associated with any of the recorded discussion.
- The interview will be conducted using a semi-structured and informal format. Several questions will be asked about both the individual knowledge and skills gained and the organization practices used.
- The interview will last approximately thirty minutes.

Interview Question

TURN RECORDER ON AND STATE THE FOLLOWING:
"This is Zarmina Hotaki, interviewing (*Participant Code)* on *(Date)* for the Dual Language study.

Interview:

To begin the conversation, please introduce yourself and describe your role at the school.

Question 1: How do you support your students who are struggling in English?
Question 2: What scaffolding techniques do you use in your classes?
Question 3: How do you deal with assessments when a student is able to explain to you that they understand the content during class discussions and group work but during summative assessments are unable to show you their understanding? Is their achievement score based on only that final summative assessment?
Question 4: For those of you who are English language learners what role based on your beliefs does the mother tongue play in the learning process when you are learning in another language—with our students in English?
Question 5: Do you ever use Arabic in teaching your content material and if so how often?

APPENDIX G: FOCUS GROUP PROTOCAL

Dual Language Learning: How can the first language be used to scaffold second language acquisition and learning?

Introduction

Thank you for taking time from your busy schedules to meet with me today. I appreciate your willingness to participate in this focus group and will limit the time to one hour.

My name is Zarmina Hotaki. I will serve as the moderator for this focus group. I am conducting research as a graduate student at East Carolina University. This focus group is part of a study to find equitable support options for second language learners. We will focus on how we can use the first language to scaffold second language acquisition and learning.

Disclosures:

- Your participation in the study is voluntary. It is your decision whether or not to participate and you may elect to stop participating in the interview at any time.
- The focus group will be recorded in order to capture a comprehensive record of our conversation. All information collected will be kept confidential. Any information collected during the session that may identify any participant will only be disclosed with your prior permission. A coding system will be used in the management and analysis of the focus group data with no names or school identifiers associated with any of the recorded discussion.
- The focus group will be conducted using a semi-structured and informal format. Several questions will be asked about both the individual knowledge and skills gained and the organization practices used. It is our hope that everyone will contribute to the conversation.
- The focus group will last approximately one hour.
-

Interview Question

TURN RECORDER ON AND STATE THE FOLLOWING:
"This is Zarmina Hotaki, running a focus group with math and science teachers on *(Date)* for the Dual Language study.

Agenda:

Before I start asking any questions. I would like to move you into 3 groups with a mix of math and science teachers.

Introduction
Each group has a specific prompt written on a piece of paper at their table. I will give you 10 minutes to discuss and write down anything that comes to mind after reading and discussing the prompt. After 10 minutes you will move to the next prompt, have 3 minutes to read the prompt and the comments, discuss for 10 minutes and write your own comments. After 13 minutes you will move to the last table, have 3 minutes to read the comments and prompt, 10 minutes to discuss and write down your own comments.
I will give you 5 minutes to walk around and read all of the comments.
Once you have had a chance to read all comments- we will sit in a circle and report out.

Prompt group 1: What role does language play in your classroom?
Prompt group 2- Have you ever had a student who knew the content but was unable to be successful due to language barrier?
Prompt group 3- Do you ever offer "extra" help to the learners who struggle with language?