

MUSIC-BASED AND LANGUAGE-BASED LITERACIES IN SPANISH-ENGLISH  
EMERGENT BILINGUAL FIRST GRADERS: MUSIC APTITUDE, PHONOLOGICAL  
AWARENESS, AND MORPHOLOGICAL AWARENESS

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BY

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## DEDICATION

To my family—Alyson, Tripp, and Hannah.

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## ABSTRACT

VICTOR ANTONIO LOZADA

### MUSIC-BASED AND LANGUAGE-BASED LITERACIES IN SPANISH-ENGLISH EMERGENT BILINGUAL FIRST GRADERS: MUSIC APTITUDE, PHONOLOGICAL AWARENESS, AND MORPHOLOGICAL AWARENESS

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The purpose of this study is to understand the relationships among music aptitude, phonological awareness in Spanish, phonological awareness in English, morphological awareness in Spanish and morphological awareness in English among first grade, Spanish-English emergent bi/multilingual students in a mid-sized suburban public school in Texas. A sequential explanatory mixed methodology was employed in which the quantitative portion used a correlational design while the qualitative portion used semi-structured interviews as writing conferences with the participants alongside writing samples to explain the quantitative data. Mixed methods analysis used the qualitative data to explain the quantitative data. This study took a critical quantitative approach, which in turn made the study a critical mixed methodology. Quantitative data indicated statistically significant relationships between (1) music aptitude and phonological awareness in Spanish, (2) phonological awareness in Spanish and phonological awareness in English, (3) phonological awareness in English and morphological awareness in English, and (4) phonological awareness in Spanish and morphological awareness in English. Qualitative data indicated the following themes that arose from the data: (1) music at home: passive listening, (2) music at home: active music making, (3) connecting sound to text: in writing, (4) connecting sound to text: in speech, (5) the presence of translanguaging, and (6) the absence of translanguaging. The qualitative data explained the statistically significant relationships found in the quantitative data. The non-statistically significant data mainly came

from relationships among the variables and morphological awareness in Spanish because the test for morphological awareness in Spanish was not appropriate for this population. Implications for music education, bi/multilingual education, early literacy indicators, and assessment.

Recommendations for policy, practice, and research include (1) the need to fund early childhood music and bi/multilingual education, (2) the importance of using the arts in bi/multilingual education, (3) the need for quick, valid, and reliable assessment tools for research and practitioner purposes, and (4) the need for researchers to translate critical methodologies to the positivist epistemologies of policymakers so that they can create a better world for minoritized populations.

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## CHAPTER I

### INTRODUCTION

Humans are a communicative, social species. Researchers have documented a variety of modes to express ourselves including music (e.g., Kress, 2010; Tomlinson, 2013). Some have claimed that as a species, we sang before we could even speak (Masataka, 2009; Mithen, 2006), so it is easy to understand why researchers desire to understand the link between language and music. To expand, language can be expressed through listening, speaking, reading, and writing. Language learning and reading or literacy have been documented as being directly related, especially among children (Genishi & Dyson, 2009; Lindfors, 2019).

The link between music and language has been well documented (Goswami, 2011; Patel, 2008). However, the nuances of that link should be better understood because this connection has begun to show how music learning can impact literacy instruction (Gordon et al., 2015; Lessard & Bolduc, 2011; Standley, 2008). Research has demonstrated that language and music interact at both a pitch level (Patel, 2008) and a temporal level (Goswami, 2011). In order to understand this interaction, one can look at music aptitude, which consists of both tonal (pitch) and rhythmic (temporal) perception (Gordon, 2012).

Music and reading ability, an aspect of literacy, are related through the connection between music learning and phonological awareness. Various studies have illustrated how music learning positively relates to phonological awareness, and thus, literacy during early childhood (Culp, 2017; Herrera et al., 2011; Patscheke et al., 2016, 2019). Many have demonstrated the positive relationship between phonological awareness and reading ability that as children increase their phonological awareness, so increases their decoding and comprehension skills (Benz et al., 2016; Bolduc, 2009; Brandt et al., 2012; Degé et al., 2015; Douglas & Willatts,

1994). With this, it is important to develop a more robust understanding about the relationship between music aptitude and phonological awareness as a means to impact reading ability because some reading differences in students have been found to persist even when given phonological awareness training (Ehri & McCormick, 2004; Juel & Minden-Cupp, 2004).

While understanding the relationship between phonological awareness and music aptitude could be addressed from a broad standpoint, research in music education often has underrepresented minoritized populations (Elpus & Abril, 2011; Lorah et al., 2014), especially the Latinx community (Lozada, et al., 2022). Many times, these students have been found to be racialized based on their linguistic repertoires as bilinguals (Flores & Rosa, 2015; Flores et al., 2020), which warrants a closer examination of their reality. Many have investigated the relationship between phonological awareness and music aptitude among bilingual individuals (Fonseca-Mora et al., 2015; Herrera et al., 2011; Pei et al., 2016; Peynircioğlu et al., 2002; Zhang et al., 2017); however, a close examination of Spanish-English bilingual individuals was not available from extant literature. This type of research could have a profound impact on instruction, especially in the context of linguistically diverse parts of the United States such as Texas. Additionally, Zhang et al. (2017) noted the balance between morphology and phonology of a language as a confounding factor, which warrants understanding them.

Such a confounding factor would warrant understanding the relationship between morphological awareness and phonological awareness. Zhang et al. (2017) found that this is an issue for bilingual Chinese-English individuals, which may indicate that other linguistic repertoires such as Spanish-English bilinguals could also have the relationship between morphological awareness and phonological awareness be a confounding factor in understanding the relationship between phonological awareness and music aptitude. Researchers have



documented the positive relationship between morphological awareness and phonological awareness among bilingual individuals with a variety of linguistic repertoires (Bishara, 2020; Lin et al., 2018; Saiegh-Haddad & Geva, 2008); however, an analysis of the relationship between morphological awareness and phonological awareness among Spanish-English bilinguals was not present among extant literature.

Music aptitude, phonological awareness, and morphological awareness are critical to early childhood development. Researchers have explained that music aptitude is a fluid intelligence that stabilizes at about age 9, when all students have completed at least first grade (Gordon, 1980a, 1987, 2012). Additionally, children have been shown to begin to understand morphological awareness as young as first grade (Carlisle, 1995; Wolter et al., 2009).

Phonological awareness can develop throughout a child's preschool and early primary school years regardless of the child's linguistic repertoire (Anthony & Francis, 2005; Anthony et al., 2011). Each of these phenomena seem to have a critical period during a child's first grade year, which would suggest that a deeper understanding of how they interact at this age is needed.

The relationship between music aptitude and phonological awareness as well as the relationship between morphological awareness and phonological awareness among bilingual individuals in Spanish-English emergent bilinguals in the United States are understudied. Additionally, Spanish-English emergent bilinguals in the United States are understudied in the context of music education. With this, it is paramount to understand the relationships among music aptitude, phonological awareness, and morphological awareness in Spanish-English bilinguals, especially in the context of linguistically diverse parts of the United States such as Texas, to improve student outcomes. This population is especially important from a

raciolinguistic perspective due to the exclusion of Latinx individuals from music education research as well as research regarding these three variables.

### **Problem Statement**

Understanding how music aptitude, phonological awareness, and morphological awareness interact among Spanish-English emergent bilinguals is paramount to beginning to advocate for bilingualism, for music education, and, most importantly, for these students. Increasing our understanding of how bilingualism and language learning in general interact is a first step toward increasing awareness of the importance of caring for the variety of ways in which people communicate. Beyond these ideas, this study also poses a way to advocate against raciolinguistic ideologies present in the educational system (Flores & Rosa, 2015).

In order to be able to advocate against the reified raciolinguistic system within education, one must connect research with policy. Federal policy favors psychometrically simple evaluation tools that can be easily expressed through statistical analyses (Foundations for Evidence-Based Policymaking Act of 2018, 2019), which means that research can better affect policy if it meets policymaking standards. Creating research that meets policy standards could allow for other ideas to enter policymakers' minds in order to advocate for bilingual students.

Additionally, connecting music education with bilingual education and research geared toward affecting policy change can create space for music education advocacy. While some would argue that an extramusical argument for music education could lead to dismissing music education (Reimer, 2005), I chose to advocate for the variety of ways that music education can develop a person's potential including the ways in which it enhances language learning in a critical way.

Beyond this, taking a critical quantitative stance (Stage & Wells, 2014) creates opportunities to question why certain groups of people are studied, especially regarding music education. Often, researchers within the field of music education research have focused their research from a methodological or topic-based approach (Killian et al., 2013; Nichols, 2013; Schmidt & Zdinski, 1993; Yarbrough, 1984, 2002), and when it does become concerned with the subjects of that research, it is focused on variables such as age or musical background (Draves et al., 2008; Kratus, 1992). When race or ethnicity is examined, it quickly becomes apparent that this area of research is underrepresented (Ebie, 2002). Lastly, and most importantly, this study centers on the experiences of children. Often, their voices get lost in the research. When research centers on their voices, more valid results occur. Connecting the experiences of these children with these critical quantitative data affords the opportunity to “conduct culturally relevant research by studying institutions and people in context” (Stage & Wells, 2014, p. 3).

### **Purpose Statement**

The purpose of this study is to understand the relationships among music aptitude, phonological awareness in Spanish, phonological awareness in English, morphological awareness in Spanish and morphological awareness in English among first grade, Spanish-English emergent bi/multilingual students in a mid-sized suburban public school in Texas. Relationships between music aptitude and phonological awareness have been documented (Gordon et al., 2015; Standley, 2008) as well as between phonological awareness and morphological awareness (Carlisle, 2003, 2010); however, no study within the extant literature has aimed to bridge these two relationships. Additionally, even though a quantitatively based study would add to the body of knowledge, it leaves out the experiences of Spanish-English emergent bilinguals in regard to these variables. None of the extant literature has attempted to

understand these phenomena in a qualitative way. This requires a qualitative look at the experiences of these first-grade students. Joining these two methods of research combine to form the present study as an explanatory sequential mixed methods design.

Lastly, Spanish-English emergent bilinguals are understudied in the contexts of research on music aptitude, the relationship between music aptitude and phonological awareness, and the relationship between phonological awareness and morphological awareness. This study provides evidence on how music and language work together to foster literacy acquisition and documents how Spanish-English emergent bilinguals in linguistically diverse parts of the United States such as Texas embody this in their experiences. This study provides relevant information on the ways in which teachers can leverage multilingual students' music aptitude, phonological awareness, and morphological awareness in order to impact literacy outcomes such as reading.

### **Research Questions**

The following questions guide this study:

#### **Quantitative Questions**

1. What relationships exist among music aptitude, phonological awareness, and morphological awareness in first grade Spanish-English emergent bilinguals in a mid-sized suburban school district in Texas on Spanish-language measures?
2. What are the relationships among music aptitude, phonological awareness, and morphological awareness in first grade Spanish-English emergent bilinguals in a mid-sized suburban school district in Texas on English-language measures?
3. What are the cross-linguistic relationships among music aptitude, phonological awareness, and morphological awareness in first grade Spanish-English emergent

bilinguals in a mid-sized suburban school district in Texas on Spanish- and English-language measures?

### **Qualitative Question**

1. How do first grade Spanish-English emergent bilinguals in a mid-sized suburban school district in Texas embody music aptitude, phonological awareness, and morphological awareness in their writing and experiences?

### **Mixed Methods Question**

1. How can the writing and experiences of first grade Spanish-English emergent bilinguals in a mid-sized suburban school district in Texas explain the relationships among music aptitude, phonological awareness, and morphological awareness in English and Spanish for first grade Spanish-English emergent bilinguals in a mid-sized suburban school district in Texas?

### **Significance of Findings**

The findings of this study are significant both in the fields of music education and literacy research because they could advocate for the early literacy education of Spanish-speaking emergent bilingual students. In addition to this, the findings also could provide an argument against raciolinguistic ideologies of language learning within the context of the U.S. educational system as well as a more fluid interpretation of language learning. Lastly, the findings of this study demonstrate the need for representation of diverse populations within samples from a music education perspective.

In the field of music education, developing an understanding of how music aptitude interacts with language-learning processes can develop a strong argument for music education for all students. While philosophers such as Reimer (2005) have argued that developing an

extramusical argument for music education might lead some to dismiss music education, I chose to advocate for the variety of ways that music education can develop a person's potential including the ways in which it enhances language learning. Connecting music education as it is with language learning can form a strong argument for maintaining music classes in early childhood education in light of budget constraints.

In addition to the ability to strengthen music education advocacy, this study could refocus music education research on minoritized populations. Often, researchers within the field of music education research have focused their research from a methodological or topic-based approach (Killian et al., 2013; Nichols, 2013; Schmidt & Zdinski, 1993; Yarbrough, 1984, 2002). When the field of music education research has become concerned with the subjects of that research, it has focused on variables such as age or musical background (Draves et al., 2008; Kratus, 1992). Ebie (2002) extended this line of thought to better understand how special populations such as race and nationality-specific populations are underrepresented in music education research. While there is much that this research can change in the field of music education, it also has a place in literacy research.

Literacy research has had a history of taking a political stance in regard to race (Freire & Macedo, 1987; Grant & Wong, 2008; Willis & Harris, 2000); however, Tomlinson (2013) advocated for deeper understanding of "children's redesign in music and literacy" (p. 7). While this study does not aim to look at the redesign of music, it does begin to nuance our understanding of how music and language are intertwined. Connecting the deep history of taking a political stance with race to the ability of music to allow "young children [to] communicate their experiences and ways of knowing through multimodal redesign in music and literacy" (Tomlinson, 2013, p. 7) creates new possibilities in education.

Studying emergent bilinguals in a way that allows for students to be seen despite their racialized or minoritized selves could be the most impactful part of this research. Focusing on the ways in which music and language interact for Spanish-English emergent bilinguals allows for researchers to redefine what they should be researching rather than what they want to research. Blending the fields of literacy and music education research allows for literacy research to push music education research to question in a racial sense and allows music education research to push literacy research to question what literacy really means.

### **Definition of Terms**

In order to best understand how each of the constructs of the study work, the following will be used as the operational definitions.

- Music aptitude is a developmental aptitude during childhood, which consists of two main dimensions: tonal and rhythmic perception (Cutietta, 1991).
- Phonological awareness is the ability to analyze and manipulate the sounds of language comprised of large units, words and syllables, and small units, phonemes (Degé & Schwarzer, 2011).
- Morphological awareness is the ability to understand and analyze meaning units (morphemes) within words to construct meaning (Carlisle, 2000).
- Emergent bilinguals are individuals who are “speakers of *one or more languages* other than English and who are developing English literacy in school” (García & Kleifgen, 2008, p. 181).
- Emergent bi/multilinguals are individuals who, like emergent bilinguals, speak multiple named languages in a multilingual context and who very well may be fully bilingual or even multilingual (Martínez, 2018).

### **Constraints of the Study**

Even though advocating for bilingual education, music education, and these children creates a strong rationale for the study, there are additional constraints to the methodology. While the current study aims to produce valid results, there are numerous additional concerns including statistical issues, positionality of the researcher, and a lack of a deep understanding of the data. While many common statistical errors such as a lack of Bonferroni correction, the misuse of validity and reliability measures, and the overreach of causal relations are addressed, some issues such as population sampling remain an issue with drawing relevant conclusions. Because of the nature of the study, the author chose a purposeful rather than random sample of Spanish-English emergent bilinguals because no list of such students across the United States exists from which one can create a random sample regarding these measures.

Beyond statistical issues, some may deem the positionality of the researcher to be an issue. I am a firm believer in the power of music and bilingual education. While it is true that I would like for this research to advocate for bilingual education as well as music education, I only believe this to be true because other authors have found a strong relationship between language and music learning (Gordon et al., 2015; Standley, 2008). This research should add to that body of knowledge; however, had these data indicated otherwise, I would have continued to create a more nuanced discussion of why this may be so.

Lastly, distilling a child's music aptitude, phonological awareness, and morphological awareness to test scores distances the subject from reality. This study aims to diminish this through its sequential explanatory mixed methods design. Even though this may be the case, not all of the children will be able to express their experiences due to the delimitations of only outlier



cases being interviewed. A subsequent study that looks at the experiences of children who are not outliers may be warranted to understand the more common case.

### **Summary**

Music and language are deeply connected. These connections need to be explored more, especially among music aptitude, phonological awareness, and morphological awareness. Once acknowledged, a more nuanced understanding of how these connections work can impact pedagogical practices not only for literacy educators but also music educators. Observing possible relationships among music aptitude as measured through the *Primary Measures of Music Audiation (PMMA)* (Gordon, 1986a), phonological awareness in Spanish through the *Test of Phonological Awareness in Spanish* (Riccio et al., 2004), phonological awareness in English through the *Phonological Awareness Test Second Edition: Normative Update* (Robertson & Salter, 2018), morphological awareness Spanish through the *Instrumento de Evaluación de Conciencia Morfológica de Escritura* (González Sánchez & García Sánchez, 2007c), and morphological awareness in English through the *Word Analogy Task* (Kirby et al., 2012) will not only give an understanding of how they interact with each other but also in a multilingual context. While quantitative analysis of these data is aligned with previous research, the next step would be to understand the experiences of first grade Spanish-English emergent bilinguals to better explain these phenomena.

## CHAPTER II

### LITERATURE REVIEW

Many have documented the myriad connections between music and other cognitive functions including music and language ability (Benz et al., 2016; Brandt et al., 2012). Given that music and language ability connect, some researchers have documented how music and language development are deeply intertwined (Goswami, 2011, 2012; Patel, 2008, 2011). Music is generally thought of as an aural phenomenon; however, like language, there are written components to it as well. Like music and language, language and literacy interact in many similar ways. Because of this, understanding literacy as “the ability to read, write, speak, listen, view, visually represent, and think in order to communicate” (International Literacy Association, 2020, para. 29) is foundational to gaining insight into the interactions between music and language. This review of literature begins with a brief overview of each variable (i.e., music aptitude, phonological awareness, and morphological awareness) and how they relate, followed by an in-depth analysis of the extant literature on each subject.

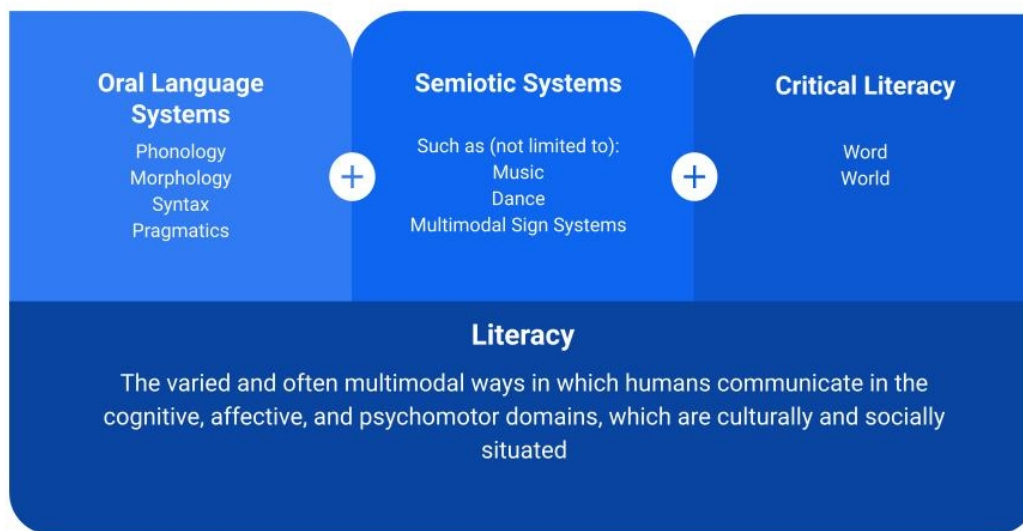
#### **Introduction to Theoretical Foundations**

Literacy is defined as the varied and often multimodal ways in which humans communicate in the cognitive, affective, and psychomotor domains, which are culturally and socially situated. Literacy comprises language systems, semiotic systems, and critical literacy (see Figure 2.1). While there are many different aspects to literacy, this study focuses on those related to the language systems: reading, writing, speaking, and listening. In order to understand how humans interact with language through speaking and listening, Pinnell and Fountas (2017) identified phonological awareness as an appropriate construct. Phonological awareness has been described as the ability to analyze and manipulate the sounds of language comprised of large

units, words and syllables, and small units, phonemes (Degé & Schwarzer, 2011). Carlisle (1995) defined morphological awareness as an individual's conscious attention to the meaningful units in words and their ability to reflect on and manipulate those units. Additionally, morphological awareness has been said to directly connect with one's ability to comprehend written language (Kirby et al., 2012). Phonological awareness and morphological awareness can both aid in the development of reading in children (Deacon & Kirby, 2004).

**Figure 2.1**

*Literacy and Its Components*



As phonological awareness and morphological awareness relate to our understanding of reading development in children, music aptitude relates to our understanding of musical development. Cutietta (1991) proposed that music aptitude is a developmental aptitude during childhood, which consists of two main dimensions: tonal and rhythmic perception. Phonological

awareness and music aptitude seem to relate on a theoretical level while morphological and phonological awareness relate on a practical level.

Because music aptitude is divided into tonal perception and rhythmic perception, two prevailing theories may explain how each is related to language. On a rhythmic level, Goswami's (2011, 2012) temporal sampling theory proposed that music and language are linked to the perception of rhythm and beat. On a pitch level, Patel's (2008) shared sound category learning mechanism hypothesis proposed that phonemes and musical notes relate to each other through our brain's shared processing of the frequency of sound. Neither of these theories can fully explain the relationship, so both are used as frameworks for understanding any relationships among music aptitude, phonological awareness, and morphological awareness.

### **Introduction to the Body of Research**

Numerous researchers have conducted reviews of literature about the relationship between music aptitude and phonological awareness (Gordon et al., 2015; Lessard & Bolduc, 2011; Standley, 2008). Even with meta-analytic research available on the relationship between music aptitude and phonological awareness, some of the studies have focused broadly on how language is constructed (Lessard & Bolduc, 2011; Standley, 2008) while Gordon et al. (2015) noted that others focused their studies narrowly and did not use operational definitions of music aptitude and phonological awareness but did relate to these two variables.

Beyond the relationship between music aptitude and phonological awareness, researchers have documented a relationship between phonological awareness and morphological awareness (Berninger et al., 2010; Carlisle & Nomanbhoy, 1993). Additionally, both phonological awareness and morphological awareness can predict literacy outcomes in young children both uniquely (Bus & van IJzendoorn, 1999; Carlisle, 2010; Kirby et al., 2012; Nunes et al., 2006;

Stahl & Murray, 1994) and combined (Bishara, 2020; Carlisle & Nomanbhoy, 1993; Deacon & Kirby, 2004; Lin et al., 2018; Lyster, 2002; Nunes et al., 2003; Saeigh-Haddad & Geva, 2008). Even though these studies have attempted to embrace diversity, some have acknowledged the anglocentricity of a large portion of the research being conducted with English orthographies (Share, 2008). Therefore, researchers must decenter language discussions away from English-only and instead embrace multilingualism, as advocated by Babino and Stewart (2020).

To decenter English-only research, researchers should understand how music aptitude, phonological awareness, and morphological awareness interact within multilingual populations. Many have studied the ways in which music aptitude (Bolduc & Montésinos-Gelet, 2005; Degé & Schwarzer, 2011; Peynircioğlu et al., 2002), phonological awareness (Bolduc & Montésinos-Gelet, 2005; Degé & Schwarzer, 2011; Peynircioğlu et al., 2002), and morphological awareness (Bishara, 2020; Lin et al., 2018; Saiegh-Haddad & Geva, 2008) work in a variety of cultures and language groups. Additionally, some studies have indicated relationships among these variables in multilingual contexts including Arabic-English (Saiegh-Haddad & Geva, 2008), Chinese-English (Lin et al. 2018; Zhang et al., 2017), Chinese-Russian (Pei et al., 2016), Turkish-English (Peynircioğlu et al., 2002), Spanish-Tamazight (Herrera et al., 2011), and Spanish-English (Fonseca-Mora et al., 2015; Gómez Domínguez, 2017; Toscano-Fuentes & Fonseca-Mora, 2012); however, one cultural group absent from the extant research has been that of Spanish-English bilinguals in the United States.

While it may seem that there is an understanding of the relationships among music aptitude, phonological awareness, and morphological awareness in many contexts, one context scarcely mentioned is that of Spanish-English bilinguals in the United States. Some have conducted specific studies about musical training for individuals in this context (Abril, 2001;

2003; Flowers & Costa-Giomi, 1991; Medina, 1990; Miranda, 2011; Van Dusen, 2016); however, scant research into how music training can affect early literacy development, especially regarding phonological and morphological awareness, has been noted. Understanding the relationships among music aptitude, phonological awareness, and morphological awareness in the context of Spanish-English bilinguals in the United States could lead to better policies and practices regarding language learning and music education.

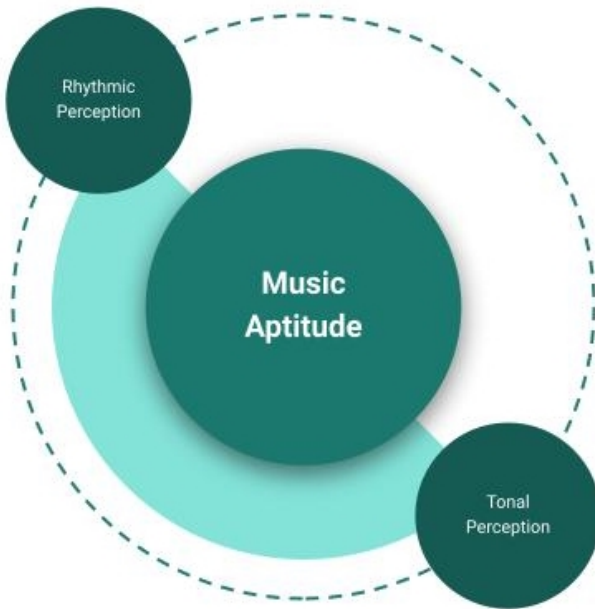
The following review of relevant literature relates the topics of music aptitude, phonological awareness, and morphological awareness, especially as it relates to Spanish-English bilinguals in the United States. Much of the literature extends beyond the scope of Spanish-English bilinguals in the United States because the extant literature did not have this population present in their studies. Skubic et al. (2021) indicated that bilingualism could be a factor in how these phenomena interact. I begin with a review of music aptitude, then move to phonological awareness, interactions between music aptitude and phonological awareness, then morphological awareness, and finally the interactions among the three.

### **Music Aptitude**

Simply put, “music aptitude is a measure of one’s potential to learn music” (Gordon, 2012, p. 44). More specifically it has been cited as a developmental aptitude during childhood, which consists of two main dimensions: tonal and rhythmic perception (Cutietta, 1991). Figure 2.2 illustrates my understanding of music aptitude. Over time, music aptitude has gone from a more psychological understanding (Seashore et al., 1956) to a more constructivist viewpoint (Gordon, 1987; 2012). While this theoretical issue may have been resolved, some applied researchers still do not use the above definition in their research (see Table 2.1).

**Figure 2.2**

*Music Aptitude and Its Components*



**Table 2.1***Operationalization of Music Aptitude in Research Studies*

Music Aptitude Measure	Studies that demonstrate this relationship
Composite	Culp, 2017; *Herrera et al., 2011; *Patscheke et al., 2016
Composite	Anvari et al., 2002; Gromko, 2005; *Herrera et al., 2011; *Kempert et al., 2016; ~Peynircioglu et al., 2002; Reifinger, 2018
Composite	*Degé & Schwarzer, 2011; *Herrera et al., 2011; *Kempert et al., 2016; *Patscheke et al., 2016
Tonal	*Bolduc & Montésinos-Gelet, 2005; Kuppen & Bourke, 2017; -Zhang et al., 2017
Tonal	Anvari et al., 2002; Culp, 2017; Forgeard et al., 2008; Lamb & Gregory, 1993
Tonal	Culp, 2017; *Patscheke et al., 2019
Rhythm	Kuppen & Bourke, 2017; -Zhang, 2017
Rhythm	Anvari et al., 2002
Rhythm	Moritz et al., 2013

*Note.*

\* Indicates studies with only non-English speaking individuals

~ Indicates studies with English speaking individuals with additional non-English speaking individuals

- Indicates studies with bilingual individuals with English as one of their languages.

Some scholars have continued to disagree about the elements of music aptitude; however, almost all of them contain some aspects of Gordon's (1987) operationalization. Gordon operationalized music aptitude as consisting of pitch and rhythm elements. The following discussion deals with the variety of ways in which scholars operationalize music aptitude and how Gordon's definition might be a more exact one.



Gordon (1987) described music aptitude as the ability to audiate, hearing music within one's mind, tonal and rhythmic patterns. The use of intelligence tests such as the *Music Aptitude Profile* (Gordon, 1965), *PMMA* (Gordon, 1986a), *Intermediate Measures of Music Audiation* (Gordon, 1982), and *Advanced Measures of Music Audiation* (Gordon, 1989) all align with this definition and have been shown to both corroborate each other and predict future music abilities (Hanson, 2019). Even though this construction of music aptitude is generally accepted, there is still some debate in the operationalization of music aptitude. Lamb and Gregory (1993) believed it to be a construct consisting of pitch and timbre while most others have believed it to be a construct consisting of pitch and rhythm (Anvari et al., 2002; Bolduc & Montésinos-Gelet, 2005; Culp, 2017; Forgeard et al., 2008; Kempert et al., 2016; Moritz et al., 2013; Peynircioğlu et al., 2002). Moritz et al. (2013) refined the definition of music aptitude to be less about culture by operationalizing it as frequency and time while Anvari et al. (2002) focused on western music culture by operationalizing it as rhythm and two types of pitch, simultaneous and sequential. Contrary to this, Peynircioğlu et al. (2002) even continued to cling to the psychological definition of music aptitude.

While most researchers have operationalized music aptitude as a construct that includes rhythmic audiation, the inner-hearing of rhythm, and melodic audiation, the inner-hearing of melody, many experimental and quasi-experimental researchers have chosen not to operationalize this way (Degé & Schwarzer, 2011; Gromko, 2005; Herrera et al., 2011; Kuppen & Bourke, 2017; Patscheke et al., 2016, 2019; Slater et al., 2014). Due to these studies looking at how music training, rather than music aptitude, impacts phonological awareness, there is no need to operationalize a definition; however, knowing the constituent parts of music aptitude could lead studies to ensure that they include both rhythmic and melodic elements.

With the ambiguity of the operationalization of music aptitude, some researcher-created tests can cause challenges with validity and reliability. If music researchers chose valid and reliable testing instruments such as the *Music Aptitude Profile* (Gordon, 1965), *PMMA* (Gordon, 1986a), *Intermediate Measures of Music Audiation* (Gordon, 1982), or *Advanced Measures of Music Audiation* (Gordon, 1987), a more tenable argument could be made in their research reports. Beyond the operationalization of music aptitude, the *PMMA* (the measure for music aptitude used within this study; Gordon, 1986a) can be used in a variety of cultural and linguistic settings.

The *PMMA* has documented validity estimates for use within the United States (Gordon, 1986a) as well as in multiple other linguistic and cultural contexts (see Table 2.2). While the *PMMA* can be used in American, Chinese, Greek, English, Korean, and Slovenian contexts, some have found that they were not exact correlates for their culture (Ji, 2012; Stamou et al., 2010). Notably absent from these analyses is that of Spanish-English emergent bilinguals within the United States. Gordon (1986a) did not note any of the students' linguistic repertoires in his studies about the *PMMA*, which given that they were conducted in the largely White, midwestern part of the United States in the 1980s, the students did not reflect the diverse and multilingual students in the United States today. While the operationalization of music aptitude has some issues with disagreement among scholars, the operationalization of phonological awareness has numerous more.

**Table 2.2***Linguistic and Cultural Contexts for the PMMA*

Linguistic/Cultural Context	Study
China	Ji, 2012
England	Holahan & Thomson, 1981
Greece	Stamou et al., 2010
Korea	Lee, 2010
Slovenia	Sicherl Kafol, 1999
United States	Gordon, 1986a

**Phonological Awareness**

Phonological awareness has been documented as the ability to analyze and manipulate the sounds of a language, which is comprised of two component parts: large units (words and syllables) and small units (phonemes; Degé & Schwarzer, 2011). Many scholars have not agreed with this, which can lead to issues with the validity and reliability of testing instruments (see Table 2.3). The three ways in which scholars have operationalized phonological awareness are (1) phonological awareness as the ability to analyze and manipulate small units of language, (2) phonological awareness as the ability to analyze and manipulate large units of language, and (3) phonological awareness as the ability to analyze and manipulate both large and small units of language. The following discussion deals with the variety of ways in which scholars have operationalized phonological awareness and how the third definition might be a more compelling one.

**Table 2.3***Operalization of Phonological Awareness Measures in Research Studies*

Phonological Awareness Measure	Studies that Demonstrate This Relationship
Composite	*Bolduc & Montésinos-Gelet, 2005; Culp, 2017; *Herrera et al., 2011; Kuppen & Bourke, 2017; *Patscheke et al., 2016; -Zhang et al., 2017
Small Units	Anvari et al., 2002; Forgeard et al., 2008; Gromko, 2005; *Herrera et al., 2011; *Kempert et al., 2016; Lamb & Gregory, 1993; *Patscheke et al., 2019; ~Peynircioğlu et al., 2002; Reifinger, 2018
Large Units	*Degé & Schwarzer, 2011; *Herrera et al., 2011; *Kempert et al., 2016; Moritz et al., 2013; *Patscheke et al., 2016

*Note.*

\* Indicates studies with only non-English speaking individuals

~ Indicates studies with English speaking individuals with additional non-English speaking individuals

- Indicates studies with bilingual individuals with English as one of their languages.

Phonological awareness can be divided into two categories: the ability to analyze and manipulate large units of sound, words and syllables, and small units of sound, phonemes (Pinnell & Fountas, 2017). When dealing with the ability to analyze and manipulate phonemes, it has been called phonemic awareness (Pinnell & Fountas, 2002, 2017). Some researchers have equated phonological awareness as phonemic awareness either by using the terms interchangeably (Anvari et al., 2002; Forgeard et al., 2008) or utilizing testing instruments that consisted of only phonemic awareness but calling it phonological awareness (Peynircioğlu et al., 2002). Other researchers have aligned with the definition of phonological awareness inclusive of large and small sound units (Bolduc & Montésinos-Gelet, 2005; Culp, 2017; Degé & Schwarzer, 2011; Herrera et al., 2011; Kempert et al., 2016; Kuppen & Bolduc, 2017; Moritz et al., 2013; Patscheke et al., 2016, 2019; Zhang et al., 2017).

As noted above, there seems to be ambiguity in the operationalized definition of phonological awareness among researchers. Without being able to operationalize the construct of phonological awareness, testing instruments can lose construct validity, which would jeopardize the overall validity of a study. These issues of validity can become confounded by the interactions between language and phonological awareness.

### ***Phonological Awareness and Language***

Similar to how I conceive oral language systems as connecting phonology, morphology (semantics), syntax, and pragmatics (see Figure 2.1), Pinnell and Fountas (2017) conceive language as comprised of the semantic, syntactic, phonological, and sometimes orthographic systems. The differences in these systems are what allow for the plethora of different languages. With this, a change in the phonology of a language can impact how phonological awareness works within a language. Some researchers have taken a deficit perspective about the relationship of the phonology of a language and possible interactions with knowing multiple languages regarding language interference (Assanova & Knol, 2021; Bhela, 1999; Syafurti & Saptura, 2021). This belief persists even though some have shown a cross-linguistic transfer regarding phonological awareness (Durgunoğlu & Öney, 1999; Durgunoğlu et al., 1993). These may be limiting factors in understanding this field of research.

Alphabetic and non-alphabetic (e.g., pictographic or logographic) languages can limit the ability of researchers to understand the relationship between music aptitude and phonological awareness as it relates to literacy because of the grapho-phonetic relationship in a particular language. Pinnell and Fountas (2017) described the grapho-phonetic relationship in language as the link between the sounds and written symbols of a language. Many studies of language have focused either on English orthography (Share, 2008) or the mono-mainstream culture (Babino &

Stewart, 2020). These issues extend beyond phonological awareness on its own but also to the relationship between phonological awareness and music aptitude.

### **Relationships Between Music Aptitude and Phonological Awareness**

Researchers have demonstrated that music instruction and literacy learning are positively associated with higher levels of music training leading to higher levels of literacy (Benz et al., 2016; Bolduc, 2009; Brandt et al., 2012; Degé et al., 2015; Douglas & Willarts, 1994). This documented association has been mainly through the relationship between music aptitude and phonological awareness, especially in early childhood (Culp, 2017; Herrera et al., 2011; Patscheke et al., 2016, 2019). To extend, a moderately positive relationship between music aptitude and phonological awareness has been observed (Gordon et al., 2015; Standley, 2008). This relationship can vary across languages; however, one particular language combination, Spanish-English, in one particular context, the United States, seems to be understudied.

The relationship between music aptitude and phonological awareness has been studied in the following alphabetic languages: English (Anvari et al., 2002; Culp, 2017; Forgeard et al., 2008; Gromko, 2005; Kuppen & Bourke, 2017; Lamb & Gregory, 1993; Lanthroum, 2011; Moreno et al., 2011; Moritz et al., 2013; Peynircioğlu et al., 2002; Reifinger, 2018; Robinson, 2010; Tsang & Conrad, 2011; Zhang et al., 2017), German (Degé & Schwarzer, 2011; Kempert et al., 2016; Patscheke et al., 2016, 2019), French (Bolduc & Montésinos-Gelet, 2005), Portuguese (Zuk et al., 2013), Slovenian (Božič et al., 2007), Spanish (Abello et al., 2014; Herrera et al., 2011), Turkish (Peynircioğlu et al., 2002), and Tamazight (Herrera et al., 2011). The extant literature indicated Cantonese Chinese (Zhang et al., 2017) as the only non-alphabetic language studied. Of the reviewed studies, none have taken into account Spanish-English bilinguals in the United States.

Many have noticed the issues apparent with bilingualism and multilingualism when understanding the link between music aptitude and phonological awareness (Fonseca-Mora & Gómez-Domínguez, 2015; Herrera et al., 2011; Zhang et al., 2017); yet scant literature has been observed that explains the relationship between music aptitude and phonological awareness among Spanish-English bilinguals in the United States. In addition to the languages that have been studied as noted above, Zhang et al. (2017) studied the relationship in a Chinese-English bilingual context; Pei et al. (2016) studied it in a Chinese-Russian context; Bolduc and Noël (2014) studied it in a French-English context; Herrera et al. (2011) studied it in a Spanish-Tamazight context; Fonseca-Mora et al. (2015) studied it in a Spanish-English context; and Peynircioğlu et al. (2002) studied it in a Turkish-English context (see Table 2.4 for a description of the language groups used in studies of phonological awareness and music aptitude). Lastly, Eccles et al. (2021) conducted a study regarding phonological awareness and music aptitude in a multilingual South African context.

**Table 2.4**

*Linguistic Repertoires from Studies on the Relationship Between Phonological Awareness and Music Aptitude*

Linguistic Repertoires*	Location	Studies
Chinese (Cantonese)	Macau	Zhang et al., 2017
German	Germany	Degé & Schwarzer, 2011; Kempert et al., 2016; Patscheke et al., 2016, 2019
French	Canada	Bolduc & Montésinos-Gelet, 2005
Portuguese	Brazil	Zuk et al., 2013
Slovenian	Slovenia	Božič et al., 2007

Linguistic Repertoires*	Location	Studies
English	Canada	Anvari et al., 2002; Moreno et al., 2011; Tsang & Conrad, 2011;
	England	Kuppen & Bourke, 2017; Lamb & Gregory, 1993
	Macau	Zhang et al., 2017
	United States	Culp, 2017; Forgeard et al., 2008; Gromko, 2005; Lanthroum, 2011; Moritz et al., 2013; Peynircioğlu et al., 2002; Reifinger, 2018; Robinson, 2010
Spanish	Chile	Abello et al., 2014
	Spain	Herrera et al., 2011
Turkish	Turkey	Peynircioğlu et al., 2002
Tamazight	Spain	Herrera et al., 2011
Chinese-English	Macau	Zhang et al., 2017
Chinese-Russian	China	Pei et al., 2016
French-English	Canada	Bolduc & Noël, 2014
Spanish-English	Spain	Fonseca-Mora et al., 2015
Spanish-Tamazight	Spain	Herrera et al., 2011
Turkish-English	Turkey	Peynircioğlu et al., 2002
English-African languages (multilingual)	South Africa	Eccles et al., 2021

*Note.*

\* Single languages are listed alphabetically. Language pairs are listed alphabetically; however, the first language is the perceived dominant language in the study.

## **Morphological Awareness**

Another factor in literacy development is morphological awareness. Carlisle (2000) defines morphological awareness as the ability to understand and analyze meaning units



(morphemes) within words to construct meaning. Morphological awareness has been found to first develop through segmenting speech followed by an increased awareness of inflectional and derivational endings (Carlisle, 2003; Wolter et al., 2009). As there has been scant literature on the relationship between morphological awareness and music aptitude, this discussion focuses on morphological awareness and its impact on literacy as well as the relationship between phonological awareness and morphological awareness.

Morphological awareness often has a positive impact on literacy; some have documented that children who have high levels of morphological awareness also tend to have high levels of literacy and comprehension (Carlisle, 2000; Kirby et al., 2012; Nunes et al., 2006). The link between morphological awareness and literacy has been found to exist for early elementary-aged students (Berninger et al., 2010; Carlisle & Nomanbhoy, 1993; Lyster, 2002) as well as late elementary-aged students (Carlisle, 2000), and has been observed in a variety of linguistic settings (Bishara, 2020; Casalis & Colé, 2009; Elbro & Arnbak, 1996; Lin et al., 2018; Lyster, 2002; Ramirez et al., 2009; Ramirez et al., 2011; Saiegh-Haddad & Geva, 2008). Even though morphological awareness can explain some of the reading ability in children, it is the relationship between morphological and phonological awareness that brings a deeper understanding, especially regarding multilingual settings.

### **Relationships Between Phonological Awareness and Morphological Awareness**

Phonological awareness and morphological awareness have been found to relate to each other, especially in regard to literacy development (Carlisle, 2003, 2010). While phonological awareness and morphological awareness have been noted as distinct phenomena (Deacon & Kirby, 2004; Elbro & Arnbak, 1996), they have been found to interact with each other in a variety of ways for individuals with varying linguistic repertoires (Bishara, 2020; Carlisle &

Nomanbhoy, 1993; Casalis & Colé, 2009; Lin et al., 2018; Nunes et al., 2003; Saeigh-Haddad & Geva, 2008).

As noted above, morphological awareness has been found to affect literacy in both early elementary-aged students (Berninger et al., 2010; Carlisle & Nomanbhoy, 1993) and late elementary-aged students (Carlisle, 2000); however, when both are taken into account, Casalis and Colé (2009) noted that phonological awareness seems to account for more of the variance explained in literacy development for younger children while Carlisle (2000) demonstrated that morphological awareness seemed to account for more of the variance explained in literacy development for older children. Even with this evidence, some have documented that both morphological and phonological awareness develop in early elementary-aged students (Berninger et al., 2010; Lyster, 2002).

Beyond the relationship of phonological awareness and morphological awareness to literacy development, unique interactions can occur depending on an individual's linguistic repertoire. As shown in Table 2.5, a variety of studies have established relationships in both monolingual (Bishara, 2020; Carlisle, 2000; Carlisle & Nomanbhoy, 1993; Casalis & Colé, 2009; Cho et al., 2008; Deacon & Kirby, 2004; Elbro & Arnbak, 1996; Kirby et al., 2012; Lyster, 2002; Pan et al., 2016; Schiff & Saiegh-Haddad, 2018) and bilingual contexts (Kieffer & Lesaux, 2008; Lin et al., 2018; Luo et al., 2014; Saiegh-Haddad & Geva, 2008). While it may seem that there is a good understanding of how phonological awareness and morphological awareness interact in a variety of linguistic situations, the one study of Spanish-English emergent bilinguals neglected to relate the two directly but instead used phonological awareness as a compounding variable to show that morphological awareness may have unique variance in regard to reading comprehension (Kieffer & Lesaux, 2008).

**Table 2.5**

*Language Groups from Studies on the Relationship Between Phonological and Morphological Awareness*

Linguistic Repertoires*	Studies
Arabic	Bishara, 2020; Schiff & Saiegh-Haddad, 2018
Chinese	Pan et al., 2016
Danish	Elbro & Arnbak, 1996
English	Carlisle, 2000; Carlisle & Nomanbhoy, 1993; Deacon & Kirby, 2004; Kirby et al., 2012
French	Casalis & Colé, 2009
Korean	Cho et al., 2008
Norwegian	Lyster, 2002
Chinese-English	Lin et al., 2018; Luo et al., 2014
English-Arabic	Saiegh-Haddad & Geva, 2008
Spanish-English	Kieffer & Lesaux, 2008

*Note.*

\* Single languages are listed alphabetically. Language pairs are listed listed alphabetically; however, the first language is the perceived dominant language in the study

### **Gaps in Literature**

A relationship has been documented between music aptitude and phonological awareness (Gordon et al., 2015; Standley, 2008) as well as between phonological awareness and morphological awareness (Carlisle, 2003, 2010). These relationships have been observed in a variety of linguistic settings (see Tables 2.3 and 2.4); however, one population that is nearly absent from the literature is that of Spanish-English emergent bilinguals in the United States. Flores and Rosa (2015) documented how this population is especially important to study from a

raciolinguistic perspective due to the exclusion of Latinx individuals in the United States from music education research as well as research in regard to these three variables.

In regard to the relationship between music aptitude and phonological awareness, researchers have used Spanish in their study of these variables (Herrera et al., 2011); however, no study within the extant literature has looked at the relationship between music aptitude and phonological awareness in a Spanish-English emergent bilingual context within the United States.

Beyond the relationship between music aptitude and phonological awareness and the absence of Spanish-English emergent bi/multilinguals as a population, studies of the relationship between phonological awareness and morphological awareness seem to negate their relationship. For example, Kieffer and Lesaux (2008) acknowledged that phonological awareness and morphological awareness in Spanish-English emergent bilingual students are related because they included phonological awareness as a control measure in their statistical model.

While the relationships between music aptitude and phonological awareness as well as between phonological awareness and morphological awareness have been cited in the literature, there is no study within the extant literature that has aimed to bridge any similarities between these two relationships. Logically, it seems as if music aptitude and morphological awareness might be related through their shared relationship with phonological awareness; however, absent empirical evidence, there is not a tenable argument for such. Beyond the relationships among music aptitude, phonological awareness, and morphological awareness and the persistent lack of studies with Spanish-English emergent bilinguals in the United States, no study within the extant literature has looked at how music aptitude is constructed within this population.

Lastly, all the above studies have looked at these phenomena from a decontextualized, quantitative perspective. Valorizing children's experiences in regard to phonological awareness, morphological awareness, and music aptitude is paramount to understanding these phenomena at a deep level for young children. When the arts are central to bilingual education, children have been found to develop academic excellence, biliteracy, cultural competence, and critical consciousness to the fullest (Barton, 2014; Berriz et al., 2019; Chappell & Faltis, 2013). Skerrett (2018) found music to have a unique place in bilingual education, especially for transnational youth. Additionally, understanding bilingual youths' experiences is important to understanding how teachers can apply their literacies and language practices to education.

Children's experiences as they relate to music and bilingual education are present in the literature, yet some age groups of children, such as first grade emergent bilingual students, have been absent from the extant literature. Minoritized youth have expressed their beliefs about the importance of literacy practices in their music in regard to a variety of musical genres (de los Ríos, 2018, 2019, 2020, 2022; de los Ríos & Portillo, 2021; Skerrett, 2018) and songwriting (Deroo & Watson, 2020; Hess, 2018; Hess et al., 2019; Tobias, 2012), yet the experiences of young bilingual children, such as first graders, have remained absent from the extant literature. Even when the experiences of children have been centered, Alvarez (2014) noted them as limited to focusing on preschool children and dealing with the choice to use their heritage language in a music setting.

While much of the extant literature has focused on a quantitative approach to the intersections among phonological awareness, morphological awareness, and music aptitude, limiting the present study to this approach to inquiry would limit the ability to gain rich, thick descriptions of how Spanish-English emergent bi/multilingual first grade children in the United

States use their language-based and music-based literacy practices to gain a deeper understanding of their world. Uniting the two necessitates taking a mixed methods approach to understanding these phenomena, which is explained in the subsequent section.

## CHAPTER III

### METHODOLOGY

The purpose of this study is to understand the relationships among music aptitude, phonological awareness in Spanish, phonological awareness in English, morphological awareness in Spanish, and morphological awareness in English among first grade, Spanish-English emergent bi/multilingual students in a mid-sized suburban public school in Texas. In order to deeply understand the relationships among these variables, a sequential explanatory mixed methods design is employed to not only quantitatively understand these variables' relationships but also understand how the experiences of first grade, Spanish-English emergent bi/multilingual students in a suburban public school in the southwestern region of the United States, more specifically Texas, affect these variables. Thirty-seven first grade students from three bi/multilingual classrooms provided quantitative data. Three of those students provided qualitative data to explain the quantitative data.

#### **Background of the Researcher/Positionality**

While many quantitative studies aim to distance the researcher from the research, I believe that it is paramount for researchers to acknowledge their presence within studies and use that as an asset. This should be so because regardless of researchers' will to distance themselves from their research, it is impossible. I am a sequential multilingual with Mexican heritage and strong linguistic repertoires in English and Spanish. Additionally, I am both a language and music teacher. While some may see each of these aspects of me as a way to impact the directionality of the research, I believe that because previous research has found positive relationships between music aptitude and phonological awareness (Gordon et al., 2015; Standley,

2008) and phonological awareness and morphological awareness (Carlisle, 2003, 2010), I am positioned to increase our understanding of these phenomena in a unique way.

I take a critical quantitative perspective, as has been advocated by Stage (2007), and Stage and Wells (2014). This perspective centers research on using data to reveal and identify systemic inequalities and inequities, to question the ways of knowing to better describe the experiences of minoritized populations, and to conduct culturally relevant research by examining people in context. As stated earlier, the Spanish-English emergent bilingual population has been vastly underrepresented within the field of music research (Ebie, 2002) as well as in the field of each of the variables and their relationships (see Tables 2.2, 2.4, and 2.5). This study focuses on conducting culturally relevant research that aims to better describe the ways in which music aptitude, phonological awareness, and morphological awareness interact in a multilingual context.

Beyond my positionality as a researcher and my critical quantitative stance, my multilingualism paired with my national heritage allows me to take an emic perspective in a research field that prefers etic perspectives, as described by Duranti (2009). While some may view these ideas as antithetical to quantitative research, I, like Knowles (2019), choose to use my position as an insider of this community to empower this minoritized population to investigate these subjects from an emic perspective. Additionally, I choose to develop a culturally relevant understanding of Spanish-English emergent bi/multilinguals in context as Stage and Wells (2014) suggested when they added the third task of critical quantitative research, “to conduct culturally relevant research by studying institutions and people in context” (p. 3). The participants of this study are members of this minoritized population: the Spanish-English emergent bi/multilingual community in the United States.



## **Research Design**

The overarching design for this study is a sequential explanatory mixed methods design (Creswell & Plano Clark, 2018). The quantitative portion of the study precedes the qualitative portion. The quantitative portion follows a correlational design and measure music aptitude, phonological awareness in Spanish, phonological awareness in English, morphological awareness in Spanish, and morphological awareness in English. The qualitative portion uses writing conferences as semi-structured interviews alongside writing samples in Spanish and English from which themes emerge. Lastly, analysis of the qualitative data is used to explain the quantitative results and answer the mixed methods research question.

## **Participants and Research Setting**

The participants in this study are first-grade emergent bilingual students at a dual language campus in a mid-sized suburban public school in Texas with linguistic repertoires that include Spanish and English. They are a purposive sample that includes emergent bi/multilingual students participating in a bilingual program. Within this school district, there are two universities and numerous multilingual students. Many campuses have a two-way dual language immersion program while some have a one-way dual language program. This particular age group is important because of the unique nature of phonological awareness development at this age, which has been shown to affect literacy in the later years (Anthony & Francis, 2015) coupled with the developmental nature of music aptitude at this age (Gordon, 2012).

The campus environment is a Title I campus in which many of the students within the dual language program qualify for free or reduced lunch. Levels of parental/family involvement and engagement are high in that many parents come to the school on a daily or weekly basis to help teachers or be with their children as well as engage with their children's learning at home.

Parents' and family's physical presence at the school was limited during the study due to COVID-19 protocols of the school.

The dual language program at this school is modeled after a two-way dual language program; however, due to state policy, many of these students only participate through the fifth-grade year. Yet, some students can continue with their language study in secondary school in a foreign language setting. Students begin kindergarten and first grade divided into two language groups: an English dominant group and a Spanish dominant group (these students have the widest variety of linguistic repertoires of the two groups). As the year progresses, they form heterogeneous language groups in which opposing language dominant pairs are made. Students in kindergarten and first grade receive literacy instruction in their perceived dominant language. English is the language of instruction for math and physical education. Spanish is the language of instruction for science and social studies although often it is done in a translanguaging fashion to facilitate the comprehensible input of students. Art and music adopt a translanguaging stance to their teaching valuing communication and language development. Students receive literacy instruction in their perceived dominant language most of the time with some literacy instruction in their additional language.

### **Risks to Participation**

This study was conducted during the COVID-19 global pandemic. This may have impacted the results of this study. In order to minimize the risks to students and researchers, the study adhered to all district, institutional review board, and university COVID-19 safety protocols including handwashing before and after meeting, face coverings on all participants and researchers, and self-screening upon arrival. One portion of the study that may have been impacted by the wearing of face coverings was the testing in phonological awareness. While

these tests are meant to measure the ways in which children interact with the phonology or sounds of a language, some students may receive information from looking at how a mouth moves. Because these measurement tools were not tested for validity and reliability with these protocols, these data might not reflect what these measurement tools purport to measure. However, because these tests measure phonological awareness and not how a child sees phonology produced by the face, these tests may still be valid and reliable.

In addition to following COVID-19 protocols to reduce the risk of exposure, other risks to participating in the study included the loss of anonymity, the loss of confidentiality, emotional discomfort, and coercion. Anonymity was guaranteed for all participants beyond the classroom. Within the classroom, it was not possible to guarantee that others would not know of participation because everyone was present in the space. All efforts to maintain confidentiality were made. Data are securely stored in locked cabinets to ensure confidentiality. Some children may have experienced discomfort because the researcher was their music teacher. They may have felt a desire to please the researcher. Because of this, every session began with the explicit assent of the participant. One child refused assent at the end of the study. Her subsequent data are not included because of this. Lastly, there was the issue of coercion. Being a classroom teacher of these children, many wished to please the researcher and participate. In order to minimize this, children were asked for their assent to participate at each session. Additionally, to reduce the risk of coercion, rather than give individual participants incentives to participate, incentives were given to the classroom teachers to purchase classroom materials.

### **Study Timeline**

To be successful in completing a study of this nature, timelines are useful to organize different portions of the study. Being a sequential, explanatory mixed methods study, the most

basic timeline is starting with the quantitative data collection, followed by the quantitative data selections, then the qualitative data collection, then the qualitative data analysis, and finally the mixed methods analysis. The following is the actual timeline of when these portions of the study occurred (see Table 3.1).

**Table 3.1**

*Study Timeline*

Institutional Review Board Approval	October 25, 2021
First Round of Recruitment	Week of October 26, 2021
Second Round of Recruitment	Week of November 8, 2021
Quantitative Data Collection	December 2021 through February 2022
Quantitative Data Analysis	Week of February 7, 2022
Qualitative Data Collection	Week of February 14, 2022
Qualitative Data Analysis	Week of February 21, 2022
Mixed Methods Analysis	Week of February 21, 2022 (following qualitative data analysis)

## Methods

Being a mixed methods study, methodological issues are discussed in terms of the quantitative, qualitative, and mixed methods portions of the study. The following section details those issues regarding the research paradigm used.

### Quantitative Methods

A correlational study is conducted to measure the relationships among music aptitude, phonological awareness in Spanish, phonological awareness in English, phonological awareness in Spanish, and morphological awareness in English. Pearson's product-moment correlation is

used because all variables are measured on the interval scale. Data are aligned with the statistical assumptions of Pearson's  $r$  including linearity, homoscedasticity, and normality of data.

All quantitative findings are reported as correlation coefficients as  $r$ -scores. Additionally, the coefficient of determination as an effect size is calculated. Both correlation coefficients and effect sizes are presented as a correlation matrix. Findings are reported using statistical significance and effect size as the coefficient of determination.

The null hypothesis ( $H_0$ ) that addresses all quantitative research questions is that there are no relationships among music aptitude, phonological awareness in Spanish, phonological awareness in English, morphological awareness in Spanish, and morphological awareness in English. The alternative hypothesis ( $H_a$ ) is that there are relationships among music aptitude, phonological awareness in Spanish, phonological awareness in English, morphological awareness in Spanish, and morphological awareness in English. Significance is evaluated using  $\alpha = 0.05$ . Accuracy is checked through analysis of outliers, linearity, and the spread of scores.

According to Standley (2008), the expected effect size of a variety of musical interventions on reading skills is of moderate strength ( $d = 0.32$ ); however, she noted that when reading instruction is purposefully incorporated into musical instruction, the observed effect size increases ( $d = 0.44$ ). While these effect sizes are for overall reading skills, Gordon et al. (2015) found that the expected effect size between music aptitude and phonological awareness should be small ( $d = 0.2$ ). Because this study is looking at more than phonological awareness, the larger effect sizes might be observed. Strength indicators are taken from Cohen's (1992) interpretation. While the previously mentioned effect sizes were from intervention studies, it should be noted that the present study is looking at correlations; thus, a more conservative approach to a priori power analysis was conducted. With that, an a priori power analysis with

power set at 0.8 and the previously mentioned level of Type-I error as 0.05 was conducted using the SPSS Version 28.0.1.0 (142) software. Both power analyses for a study using an Analysis of Variance (ANOVA) and Pearson are given because these effect sizes most accurately reflect the use of an ANOVA; however, the present study aimed to look at correlations. Each of the sample sizes calculated indicated that sample size varied significantly (see Table 3.2).

**Table 3.2**

*Meta-Analysis Effect Sizes and Prescribed Sample Size*

Effect Size	Prescribed Sample Sizes	
	ANOVA (Comparison)	Pearson (Correlation)
0.20	200	36
0.32	80	22
0.44	44	15

With the wide range of prescribed sample sizes and the array of reading measures tested in this study, the best approach would be to use a sample size somewhere within the range. It seems like a sample size greater than 22 would be appropriate. This study used 37 students from the ages of 6-7 in first grade as these students may see the biggest gains from the development of music aptitude, phonological awareness, and morphological awareness. Each of these students are emergent bi/multilingual with linguistic repertoires that include Spanish and English.

### ***Validity***

Validity has been cited as how accurate a measurement tool is or the ability to measure what it states to be measuring (American Educational Research Association, 2018; Huck, 2012). In order to have a valid study, each measurement tool needs to be estimated as valid. The tools

used in this study are the *PMMA* (Gordon, 1986a), the *Phonological Awareness Test 2: Normative Update* (*PAT-2*; Robertson & Salters, 2018), *Test of Phonological Awareness in Spanish* (*TPAS*; Riccio et al., 2004), the word analogy task (*WAT*; Kirby et al., 2012), and the *Instrumento de Evaluación de la Conciencia Morfológica en Escritura* [Evaluation of Morphological Awareness in Writing] (*IECME*; González Sánchez & García Sánchez, 2007c).

**Primary Measures of Musical Audiation.** The *PMMA* has been tested for content validity, concurrent (criterion-related) validity, congruent validity, and longitudinal predictive validity (Gordon, 1986a). The test items were derived from the *Musical Aptitude Profile* (Gordon, 1965) and *Iowa Tests of Music Literacy* (Gordon, 1970). Both tests documented content validity in their manuals. Additionally, a tonal and rhythmic taxonomy was conducted from which factor analysis was conducted in order to find the most discriminatory test questions were combined (Gordon, 1981, 1986b).

Content validity has been documented for a variety of populations within the United States (Gordon, 1979, 1980a, 1980b). Additionally, some have affirmed the ability of the *PMMA* to measure developmental music aptitude in children younger than third grade (Geissel, 1985). Continued studies of the *PMMA* demonstrated that criterion validity is moderately correlated to performance achievement (Hanson, 2019).

Continuing with validity measures, the *PMMA* documented congruent validity, a relationship between two tests that pose to measure the same phenomenon (Gordon, 1986b). Moderate relationships were observed (a) between the *PMMA* and the *Intermediate Measures of Music Audiation* (range of 0.51-0.74) and (b) between the *PMMA* and the *Musical Aptitude Profile* (range of 0.34-0.71).

Lastly, longitudinal predictive validity has been demonstrated for the *PMMA* (Gordon, 1986a). Woodruff (1983) demonstrated predictive validity through relating pre-test *PMMA* scores with violin ability. Of the scores, the tonal subtest better predicted violin ability than the rhythmic subtest. While these measures of validity estimate that the *PMMA* is valid, another important measure is that of reliability.

**Test of Phonological Awareness in Spanish.** The *TPAS* has been tested for content (content-description) validity, congruent (criterion-predictive) validity, and construct validity (Riccio et al., 2004). The test items were derived from the *Lindamood Auditory Conceptualization Test* (Lindamood & Lindamood, 1979), the *Phonological Awareness Profile* (Robertson & Salter, 1995), the *Test of Phonological Awareness* (Torgesen & Bryant, 1994), the *Comprehensive Test of Phonological Processes* (CTOPP; Wagner et al., 1999), and the *Illinois Test of Psycholinguistic Abilities—Third Edition* (Hammill et al., 2001).

Content (content-description) validity was documented through a qualitative content validity panel including people from a variety of geographies and Spanish language dialects including Florida, Texas, Chile, Spain, and Mexico. Additionally, differential item functioning analysis was conducted to diminish item bias (Riccio et al., 2004).

Continuing with validity measures, Riccio et al. (2004) demonstrated congruent (criterion-predictive) validity as a correlation between the *TPAS* and the *CTOPP* (Wagner et al., 1999). When the three subtests for younger children on the *TPAS* (initial sounds, final sounds, and rhyming words) and the three comparable subtests on the *CTOPP* (beginning sounds, ending sounds, and categorization) were correlated, the correlation indicated validity ( $\alpha = .88$ ). When the composite tests were correlated, they also indicated validity ( $\alpha = .84$ ).



Lastly, Riccio et al. (2004) measured construct validity through confirmatory factor analysis. This analysis indicated that the test was also valid ( $\alpha = .91$ ). While these validity measures were acceptable, test reliability is also needed to create useful results.

**Phonological Awareness Test Second Edition: Normative Update.** The *PAT-2* has been tested for content (content-description) validity, congruent (criterion-predictive) validity, and construct validity (Robertson & Salter, 2018). Test items were derived from recommendations from the National Reading Panel (2000) including manipulating phonemes and spoken units larger than phonemes (syllables and words) through isolation, deletion, and substitution.

Content (content-description) validity was documented through the correspondence to the National Reading Panel's (2000) research-based suggestions as to what phonological awareness is: the ability to manipulate phonemes (small units of sounds) and spoken units larger than phonemes (syllables and words). Additionally, conventional item analysis was used in the construction of the test in order to validate the summed score (Robertson & Salter, 2018).

Continuing with validity measures, Robertson and Salter (2018) demonstrated congruent (criterion-predictive) validity as a correlation between the *PAT-2* and *Comprehensive Test of Phonological Processing: Second Edition (CTOPP-2)*; Wagner et al., 2013). The phonological awareness index for the *PAT-2* and the *CTOPP-2* score had a nearly perfect correlation ( $\alpha = .92$ ).

Lastly, Robertson and Salter (2018) measured construct (construct-identification) validity through confirmatory factor analysis. This analysis indicated that the test was also valid ( $\alpha = .99$ ). While these validity measures were acceptable, test reliability is also needed to create useful results.

**Instrumento de Evaluación de la Conciencia Morfológica en Escritura.** The *IECME* has been tested for content validity and construct validity (González Sánchez & García Sánchez, 2007b). Test items were derived from morphological awareness test such as the *Suffix Choice Test* (Beringer et al., 2001), the *Morphological Relatedness Test* (Berko, 1958), *Production and Judgment* (Carlisle, 1995), and the *Morpheme Identification Test and Morphological Construction* (McBride-Chang et al., 2003). No tests in Spanish were available in the extant literature, so González Sánchez and García Sánchez (2007b) used English and Chinese morphological awareness tests as models.

Content validity was documented through the correspondence of tasks on the test to what the Real Academia Española de la Lengua considered to form a part of Spanish morphology. Additionally, a factor analysis indicated that 70.8565% of the variance explained was from the test. (González Sánchez & García Sánchez, 2007b)

Continuing with validity measures, construct validity was through confirmatory factor analysis. This analysis indicated that 74.82% of the variance was explained by the *IECME*. While this is lower than my acceptable measure ( $\alpha = .8$ ), it is the only test in morphological awareness in Spanish that has validity measures. Given these validity measures, it is increasingly important to maintain test reliability to obtain useful results.

**Word Analogy Task.** The *WAT* has been documented to have content validity through the correspondence with other tests of morphological awareness. The *WAT* included two subtasks, one of 10 inflectional items and one of 10 derivational items; about half of the items had a phonological change while the remaining items did not (Kirby et al., 2012). These items were modeled off of Nunes et al. (1997a, 1997b) and Kemp (2006). While these validity measures are acceptable, it should be noted that the validity measures for morphological

awareness in English are not as robust as the validity measures for music aptitude, phonological awareness in Spanish, or phonological awareness in English. Additionally, test reliability is also needed to create useful results.

### ***Reliability***

Reliability is the idea that a measurement tool will remain consistent, both over time and from subject to subject as well as among other aspects (American Educational Research Association, 2018; Huck, 2012). Making sure that measurement tools consistently measure constructs accurately is important to making sure that research reflects accurate results. Each of the tests need to be reliable; however, both validity and reliability are also situational. Even with documentation of a test's validity and reliability, it is best to show that a test is both valid and reliable for a study's particular sample and population. This is especially important because Abello et al. (2014) noted that there was not a link between music aptitude and phonological awareness in Spanish and did not conduct validity and reliability measures on their measurement tool for music aptitude.

**Primary Measures of Music Audiation.** Even though it is best to conduct reliability measures for a particular study's population, knowing the test author-estimated reliability of a test can be an important baseline. The *PMMA* provides split-halves and test-retest reliability measures in the manual for kindergarten first, second, and third grade students (Gordon, 1986a). Split-halves reliability has been generally acceptable ( $\alpha \geq 0.80$ ) except for the rhythm subtest for kindergarteners. Gordon (1986a) reasoned that this was “because they [young children] lack coordination skill, lack experience in moving their bodies rhythmically” (p. 90).

While split-halves reliability measures may be generally acceptable, it seems as if test-retest reliability has been low, but this may be due to the developmental nature of music aptitude.

Because music aptitude becomes stable at about age 9, each of these values may seem low due to children's ability to develop their music aptitude until then. The range of values for test-retest varies but is generally higher for the tonal subtest (0.68-0.73) and the composite score (0.73-0.76) than the rhythm subtest (0.60-0.73; Gordon, 1986a).

**Test of Phonological Awareness in Spanish.** The *TPAS* provides internal consistency, test-retest, and interrater reliability. Internal consistency was demonstrated for all age groups (four through ten years of age) on all subtests and the composite score with a range of .87 to .98 using Cronbach's (1951) coefficient alpha. The initial sounds subtest had an average internal consistency of .92, the final sounds subtest had an average internal consistency of .92, the rhyming words subtest had an average internal consistency of .93, and the deletion had an average internal consistency of .96. The overall internal consistency of phonological awareness ability (the summed test) was .97. (Riccio et al., 2004)

Beyond internal consistency, Riccio et al. (2004) demonstrated test-retest reliability using seventy students from California and Texas. Correlation coefficients between first and second testings on all subtests and the composite score ranged from .74 to .88. The initial sounds subtest had a correlation of  $r = .79$ , the final sounds subtest had a correlation of  $r = .82$ , the rhyming words subtest had a correlation of  $r = .81$ , and the deletion subtest had a correlation of  $r = .86$ . The overall test-retest reliability had a correlation of  $r = .81$ , which is in the acceptable range.

Lastly, interrater reliability was assessed using two fluent Spanish-speaking graduate students. Correlation coefficients between the two judges were all greater than .97. The initial sounds subtest had a correlation of  $r = .97$ , the final sounds subtest had a correlation of  $r = .98$ , the rhyming words subtest had a correlation of  $r = .98$ , and the deletion subtest had a correlation of  $r = .98$ . The overall interrater reliability of the *TPAS* had a correlation of  $r = .97$ .

**Phonological Awareness Test Second Edition: Normative Update.** The *PAT-2* provides internal consistency, test-retest, and interrater reliability. Because the present study only focused on the phonological awareness index portion of this test, only those reliabilities will be reported. Internal consistency was demonstrated for all age groups (5-9 years of age) on all subtests and the composite score with a range of .72 to .96 using Cronbach's (1951) coefficient alpha. The rhyming subtest had an average internal consistency of .89, the segmentation subtest had an average internal consistency of .86, the isolation subtest had an internal consistency of .91, the deletion subtest had an internal consistency of .85, the substitution subtest had an internal consistency of .84, and the blending subtest had an internal consistency of .83. The overall internal consistency for the phonological awareness index (the summed test) was .96 (Robertson & Salter, 2018).

Beyond internal consistency Robertson and Salter (2018) demonstrated test-retest reliability using 141 students ranging in age from 5 years and 0 months to 9 years and 11 months old (the range of ages for the test). These students represented a diverse student population including both genders, White students, Black/African American students, Asian/Pacific Islander students, and Hispanic students. Correlation coefficients between the first and second testing on all subtests and the composite score ranged from .81 to .98. The rhyming subtest had a correlation of  $r = .89$ , the segmentation subtest had a correlation of  $r = .87$ , the isolation subtest had a correlation of  $r = .88$ , the deletion subtest had a correlation of .91, the substitution subtest had a correlation of .92, and the blending subtest had a correlation of .96. The overall test-retest reliability had a correlation of  $r = .95$ , which is in the acceptable range.

Lastly, interrater reliability was assessed using eight speech-language pathologists. Correlation coefficients among the judges ranged from .95 to .99. All subtests and the overall phonological awareness index had interrater reliability correlations of  $r = .97$ .

**Instrumento de Evaluación de la Conciencia Morfológica en Escritura.** The *IECME* provides internal consistency as its reliability measure. The overall internal consistency of the *IECME* using Cronbach's (1951) coefficient alpha is .9267, which is within the acceptable range. (González Sánchez & García Sánchez, 2007b)

**Word Analogy Task.** The *WAT* provides split-half reliability coefficients for Grades 1, 2, and 3. They were .80, .91, and .89, which are all in the acceptable range.

### **Qualitative Methods**

After the initial data analysis of the quantitative data, unique cases of students that (1) scored high on the *PMMA*, the music aptitude measure, (2) scored high on the *IECME*, the morphological awareness in Spanish measure, and (3) whose morphological awareness scores did not align with previous literature because they scored high on the *IECME*, the morphological awareness measure in Spanish, and the *WAT*, the morphological awareness measure in English, became the qualitative sample population. For the present study, there are three cases, Carolina, Maria Theresa, and Antonio, respectively. Semi-structured interviews of these subjects as writing conferences serve as the data for understanding their experiences, as described by Harrell and Bradley (2009). Additionally, a writing sample in English and a second writing sample in Spanish are used to triangulate the data observed quantitatively through the assessments and qualitatively through the writing conference.

### ***Writing Sample***

Each classroom teacher provided access to the writing portfolios of each child. The classroom teachers worked from a writing curriculum that includes daily writing based on Calkins' (1986) work. These children wrote daily in their language arts and science lessons in both Spanish and English. From this, the principal investigator selected a Spanish and an English text from the portfolios that seemed to best showcase the child's writing. Because students' linguistic repertoires varied, these writing samples represented the child's ability to produce text in the target language. With that, there was great variability in the types of writing samples including both narrative and expository texts. Be that as it may, most participants had produced at least one writing sample that used child-produced illustrations to enhance the text. Most writing samples were of this type; however, some of the samples included journal entries. These writing samples were used as starting points for a writing conference with the selected cases much like Genishi and Dyson (2009) did in their work.

### ***Writing Conferences***

Calkins (1986) detailed how writing conferences could be used to teach writing including through content, design, process, evaluation, and editing. These students are taught using Calkins' work, so it was very familiar for them to talk about their writing. These conferences were content conferences in which students talked about what they wrote, and I inquired about the content to gain understanding. I then presented their writing in Spanish then their writing in English. First, the children read their writing out loud. Then, the children were asked to talk about their writing. Most of the conversations centered on the content of the writing; however, because the children were familiar with the different types of conferences, some of them focused on how they wrote or the editing process.

Children used their writing samples in Spanish and English as a starting point in these discussions. Because these students were familiar with conducting these writing conferences in Spanish, I did the same; however, opportunities for translanguaging were given. These writing conferences gave the opportunity for an embedded semi-structured interview in which participants could express their embodiment of music aptitude, phonological awareness, or morphological awareness if not presented within the writing conference.

### ***Semi-Structured Interviews***

To ensure that all variables studied were present in the qualitative sessions, semi-structured interviews within the writing conferences were done. All the writing conferences started with the directive of wanting to talk about their writing. From there, participants guided the writing conference to talk about the content of the writing. When I noticed that the writing conference only led to discussions about phonological awareness and morphological awareness, the question, “Qué haces con la música en casa? [What do you do with music at home?]” was asked. From here, all data from the writing samples, writing conferences, and semi-structured interviews were analyzed to find how these children embodied music aptitude, phonological awareness, and morphological awareness.

### ***Qualitative Data Analysis***

Simple qualitative analysis starting with the a priori codes of music aptitude, phonological awareness, and morphological awareness were used to guide initial coding. From there, first cycle, in vivo coding informed the initial coding (Miles et al., 2014; Saldaña, 2016). Extending the initial coding, second cycle coding informed the categories from the first cycle. The a priori codes were selected because they reflected the variables studied in the quantitative portion of the study broadly: music aptitude, phonological awareness, and morphological



awareness. Initial in vivo coding of the transcripts was conducted to see what themes emerged. These themes were then triangulated with the writing samples to verify coding. Finally, second cycle coding of the three codes for each of the first cycle codes led to additional subcategories within each of the initial codes. These codes were then triangulated with the writing samples. The only codes that could not be triangulated with the writing samples were those pertaining to the embodiment of music aptitude.

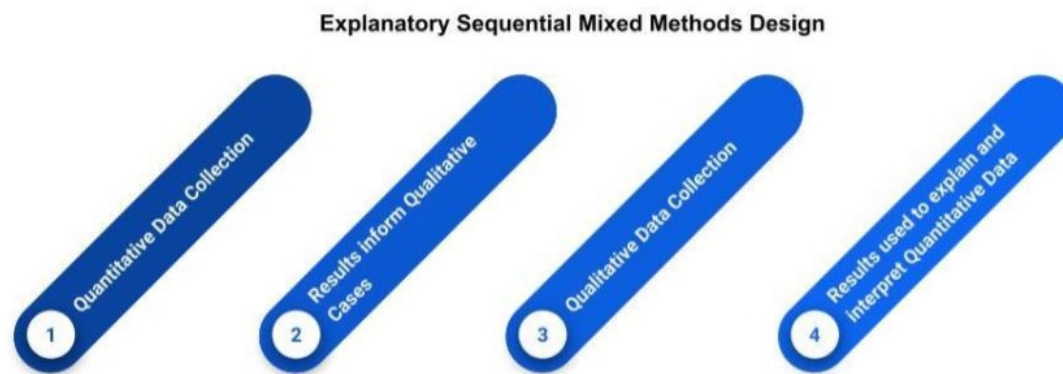
From these analyses, themes emerged that showed how these individuals embodied music aptitude, phonological awareness, and morphological awareness in their experiences. After these data are coded, they are used to interpret the quantitative data. All qualitative findings are reported as quotations from discourse with the participants that explain how they embody music aptitude, phonological awareness, and morphological awareness as well as writing samples to triangulate these data.

### **Mixed Methods**

The themes and data from the qualitative portion of the study are used to interpret and explain the relationships in the quantitative data analysis among music aptitude, phonological awareness in English, phonological awareness in Spanish, morphological awareness in English, and morphological awareness in Spanish. This process aligns with an explanatory sequential design as seen in Figure 3.1 (Creswell & Plano Clark, 2018).

**Figure 3.1**

*Explanatory Sequential Mixed Methods Design*



*Note.*

Adapted from *Designing and Conducting Mixed Methods Research*, by Creswell and Plano Clark, 2018.

Each correlation was compared to previously available research to check for alignment. To interpret these findings, the qualitative data were used to explain why the quantitative data may or may not have aligned with previous research or how they added to the body of knowledge about these phenomena. In addition to overall correlation coefficients, individual case's quantitative data were presented using z-scores to show how each case compared to the overall mean. When relevant, individual case data were used to triangulate the mixed methods findings.

### **Summary**

The present study uses an explanatory, sequential mixed methods design (Creswell & Plano Clark, 2018) to understand the relationships among music aptitude, phonological awareness in English, phonological awareness in Spanish, morphological awareness in English, and morphological awareness in Spanish among first grade, Spanish-English emergent

bi/multilingual students in a mid-sized suburban public school in Texas. The quantitative portion of the study utilizes a correlational design that looks at the relationships among music aptitude as measured by the *PMMA*, phonological awareness in Spanish as measured by *TPAS*, phonological awareness in English as measured by the *PAT-2*, morphological awareness in Spanish as measured by the *IECME*, and morphological awareness in English as measured by the *WAT*.

Upon completion of the quantitative portion, a qualitative portion commenced that aimed to understand the experiences of the participants in regard to the aforementioned variables. Data analysis was conducted from semi-structured interviews as writing conferences and analyzed through qualitative analysis (Miles et al., 2014). Data were triangulated through writing samples in both English and Spanish. Once qualitative data were collected, mixed methods analysis of the data was conducted to explain the phenomena demonstrated in the quantitative portion.

## CHAPTER IV

### FINDINGS

Music-based and language-based literacies interact in many ways. Some of those ways include music aptitude, phonological awareness, and morphological awareness in monolingual and bi/multilingual settings. Previous research indicated that music aptitude and phonological awareness are positively related in English as well as other languages (Culp, 2017; Gordon et al., 2015; Herrera et al., 2011; Patscheke et al., 2016, 2019; Standley, 2008). Previous studies also indicated that phonological awareness and morphological awareness are positively related in monolingual (Deacon & Kirby, 2004; Elbro & Arnbak, 1996) and bi/multilingual environments (Bishara, 2020; Carlisle & Nomanbhoy, 1993; Casalis & Colé, 2009; Lin et al., 2018; Nunes et al., 2003; Saeigh-Haddad & Geva, 2008). The following data extend these bodies of knowledge and move the fields of music education, bi/multilingual education, and literacy education toward a more holistic understanding of these phenomena through qualitative analysis of the data.

The purpose of this study was to understand the relationships among music aptitude, phonological awareness in Spanish, phonological awareness in English, morphological awareness in Spanish and morphological awareness in English among first grade, Spanish-English emergent bi/multilingual students in a mid-sized suburban public school in Texas. It employed a sequential explanatory mixed methodology. The quantitative portion of the study took a critical quantitative approach by questioning the ways of knowing about the interactions among music aptitude, phonological awareness, and morphological awareness in the minoritized population of Spanish-English emergent bilingual students. The qualitative portion of the study included writing conferences with unique cases from the data that aim to explain the observed

phenomena more deeply. The mixed methods analysis looked to bridge what was observed in these conferences with the quantitative data to explain these unique cases.

First, a presentation of the findings of the quantitative data is given. This section is guided by the following research questions:

1. What relationships exist among music aptitude, phonological awareness, and morphological awareness in first grade Spanish-English emergent bilinguals in a mid-sized suburban school district in Texas on Spanish-language measures? (RQ 1)
2. What are the relationships among music aptitude, phonological awareness, and morphological awareness in first grade Spanish-English emergent bilinguals in a mid-sized suburban school district in Texas on English-language measures? (RQ 2)
3. What are the cross-linguistic relationships among music aptitude, phonological awareness, and morphological awareness in first grade Spanish-English emergent bilinguals in a mid-sized suburban school district in Texas on Spanish- and English-language measures? (RQ 3)

These questions guide the following portion of the mixed methodology by finding unique cases that can explain the quantitative data.

Next, a presentation of the findings connected to the qualitative data is given. This section is guided by the following research question:

1. How do first grade Spanish-English emergent bilinguals in a mid-sized suburban school district in Texas embody music aptitude, phonological awareness, and morphological awareness in their writing and experiences? (RQ 4)

This question connects the qualitative data directly to the quantitative portion of the study to explain the quantitative data.

Lastly, a presentation of how the qualitative data explains the quantitative data in order to fulfill a mixed methodology is presented. This section is guided by the following research question:

1. How can the writing and experiences of first grade Spanish-English emergent bilinguals in a mid-sized suburban school district in Texas explain the relationships among music aptitude, phonological awareness, and morphological awareness in English and Spanish for first grade Spanish-English emergent bilinguals in a mid-sized suburban school district in Texas? (RQ 5)

### **Quantitative Data: Correlations**

While some may question the ability for quantitative research to critique reality, Stage and Wells (2014) strove to conduct critical quantitative research as “culturally relevant research by studying institutions and people in context” (p. 3). These data look at emergent bilingual first graders from this point of view in which their bilingualism serves as an asset. The following section outlines the relationships among music aptitude, phonological awareness in English, phonological awareness in Spanish, morphological awareness in English, and morphological awareness in Spanish.

The sample population included 37 first grade emergent bilingual children dispersed over three classrooms within the same mid-sized suburban Texas school. The sample size of each test varied because one participant left during the middle of the study, another child no longer assented to the study after completing four of the five tests, and some tests were not completed by the child.

The mean, sample size, and standard deviations of each test along with the construct measured is seen in Table 4.1. For the music aptitude measure, the *PMMA*, this sample ( $n = 35$ )

had a range of 6–72, an average score of 54.457, and a standard deviation of 15.378. For the phonological awareness in Spanish measure, the *TPAS*, this sample ( $n = 35$ ) had a range of 93–135, an average score of 113.343, and a standard deviation of 11.433. For the morphological awareness in Spanish measure, the *IECME*, this sample ( $n = 28$ ) had a range of 0–24, an average score of 7.179, and a standard deviation of 5.982. For the phonological awareness in English measure, the *PAT-2*, this sample ( $n = 33$ ) had a range of 79–126, an average score of 98.182, and a standard deviation of 12.169. For the morphological awareness in English measure, the *WAT*, this sample ( $n = 35$ ) had a range of 0–15, an average score of 5.143, and a standard deviation of 12.169.

**Table 4.1**

*Sample Sizes, Standard Deviations, and Means for Each Variable*

Test	Construct	<i>N</i>	<i>SD</i>	<i>M</i>
<i>PMMA</i> (Gordon, 1986a)	Music Aptitude	35	15.378	54.457
<i>TPAS</i> (Riccio et al., 2004)	Phonological Awareness in Spanish	35	11.433	113.343
<i>IECME</i> (González & García, 2007c)	Morphological Awareness in Spanish	28	5.982	7.179
<i>PAT-2</i> (Robertson & Salter, 2018)	Phonological Awareness in English	33	12.169	98.182
<i>WAT</i> (Kirby et al., 2012)	Morphological Awareness in English	35	3.711	5.143

## Music Aptitude and Language Measures in Spanish

The first research question asked what relationships exist among music aptitude, phonological awareness, and morphological awareness in first grade Spanish-English emergent bilinguals in a mid-sized suburban school district in Texas on Spanish-language measures? To understand these relationships, a Pearson product moment correlation was used. These relationships are shown in Table 4.2.

**Table 4.2**

*Correlations Among Music Aptitude, Phonological Awareness in Spanish, and Morphological Awareness in Spanish*

	Music Aptitude	Phonological Awareness in Spanish	Morphological Awareness in Spanish
Music Aptitude	1	.380*	-.123
Phonological Awareness in Spanish		1	-.215
Morphological Awareness in Spanish			1

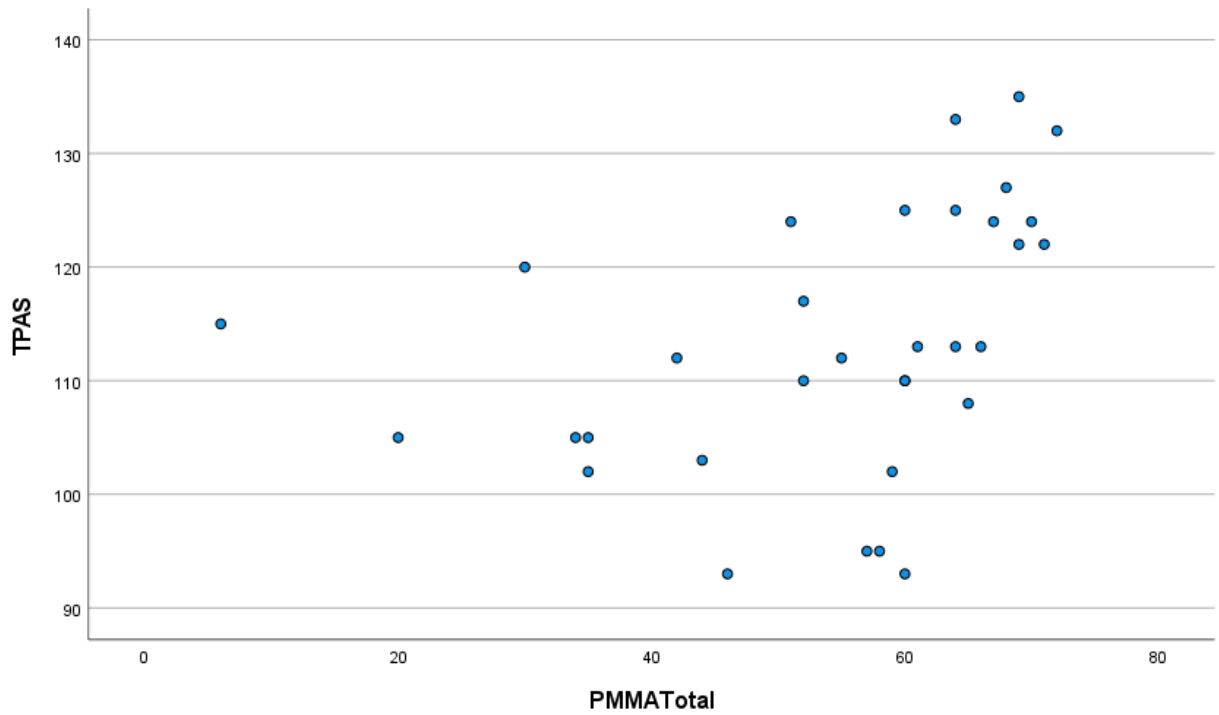
\*  $p < .05$

A scatter plot reveals that there is a positive correlation between music aptitude and phonological awareness in Spanish (see Figure 4.1). This relationship is statistically significant ( $r = .380, p = .029$ ) and considered medium by Cohen's (1992) interpretation. The effect size of this relationship as measured by the coefficient of determination is moderate in magnitude ( $R^2 = .144$ ) by Cohen's interpretation.



**Figure 4.1**

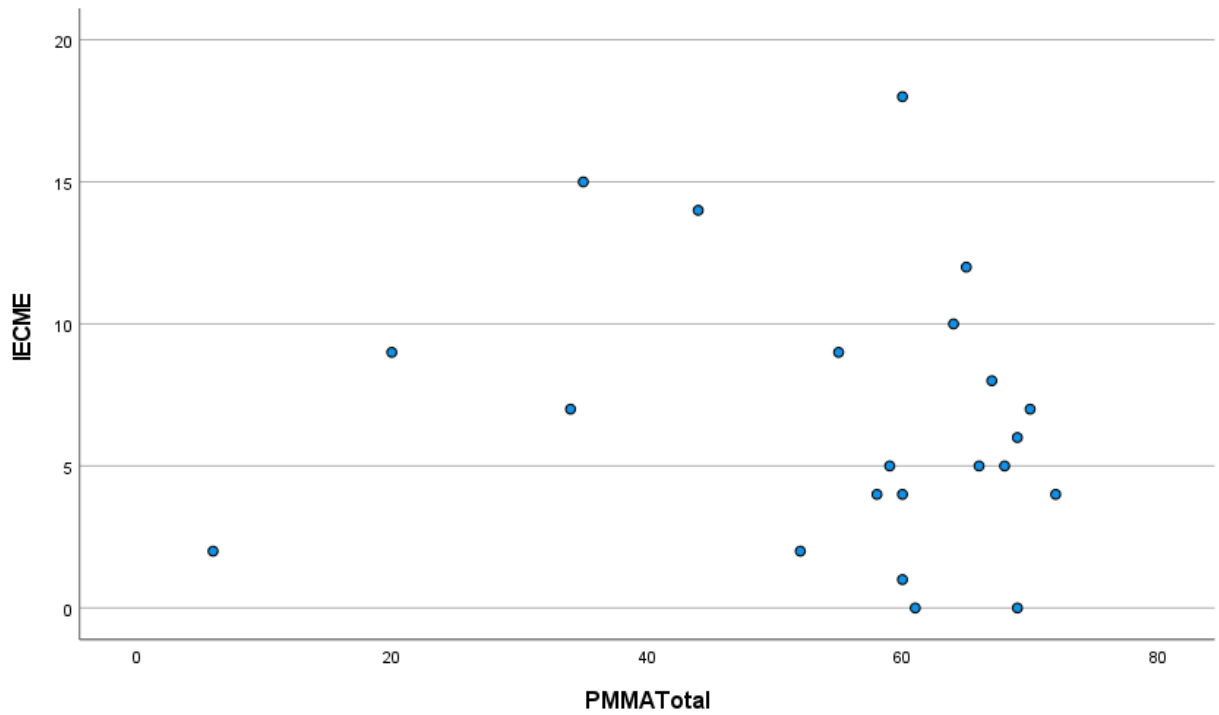
*Relationship Between Music Aptitude and Phonological Awareness in Spanish*



A scatter plot reveals that there is no relationship between music aptitude and morphological awareness in Spanish (see Figure 4.2). This relationship is not statistically significant ( $r = -.123$ ,  $p = .586$ ) and considered small by Cohen's (1992) interpretation. The effect size of this relationship as measured by the coefficient of determination is very weak in magnitude ( $R^2 = .015$ ) by Cohen's interpretation.

**Figure 4.2**

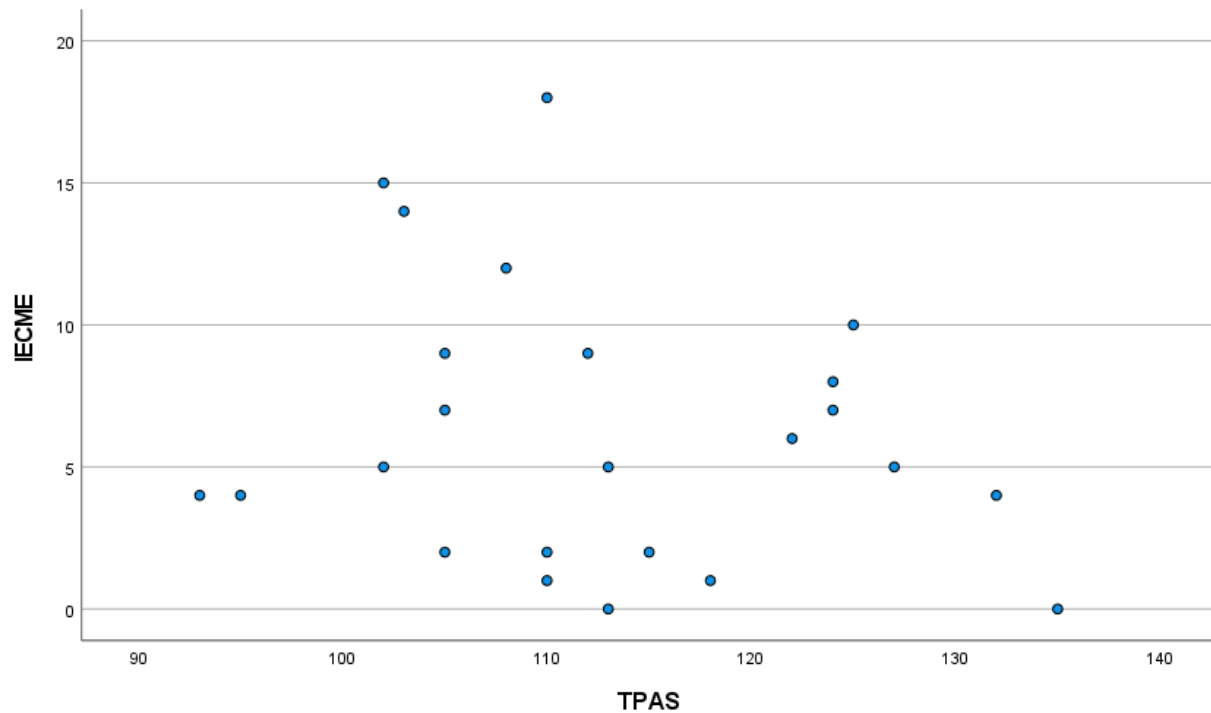
*Relationship Between Music Aptitude and Morphological Awareness in Spanish*



A scatter plot reveals that there is no relationship between phonological awareness in Spanish and morphological awareness in Spanish (see Figure 4.3). This relationship is not statistically significant ( $r = -.215, p = .312$ ) and considered small by Cohen's (1992) interpretation. The effect size of this relationship as measured by the coefficient of determination is weak in magnitude ( $R^2 = .046$ ) by Cohen's interpretation.

**Figure 4.3**

*Relationship Between Phonological Awareness in Spanish and Morphological Awareness in Spanish*



### **Music Aptitude and Language Measures in English**

The second research question asked what relationships exist among music aptitude, phonological awareness, and morphological awareness in first grade Spanish-English emergent bilinguals in a mid-sized suburban school district in Texas on English-language measures? In order to understand these relationships, a Pearson product moment correlation was used. These relationships are shown in Table 4.3.

**Table 4.3**

*Correlations Among Music Aptitude, Phonological Awareness in English, and Morphological Awareness in English*

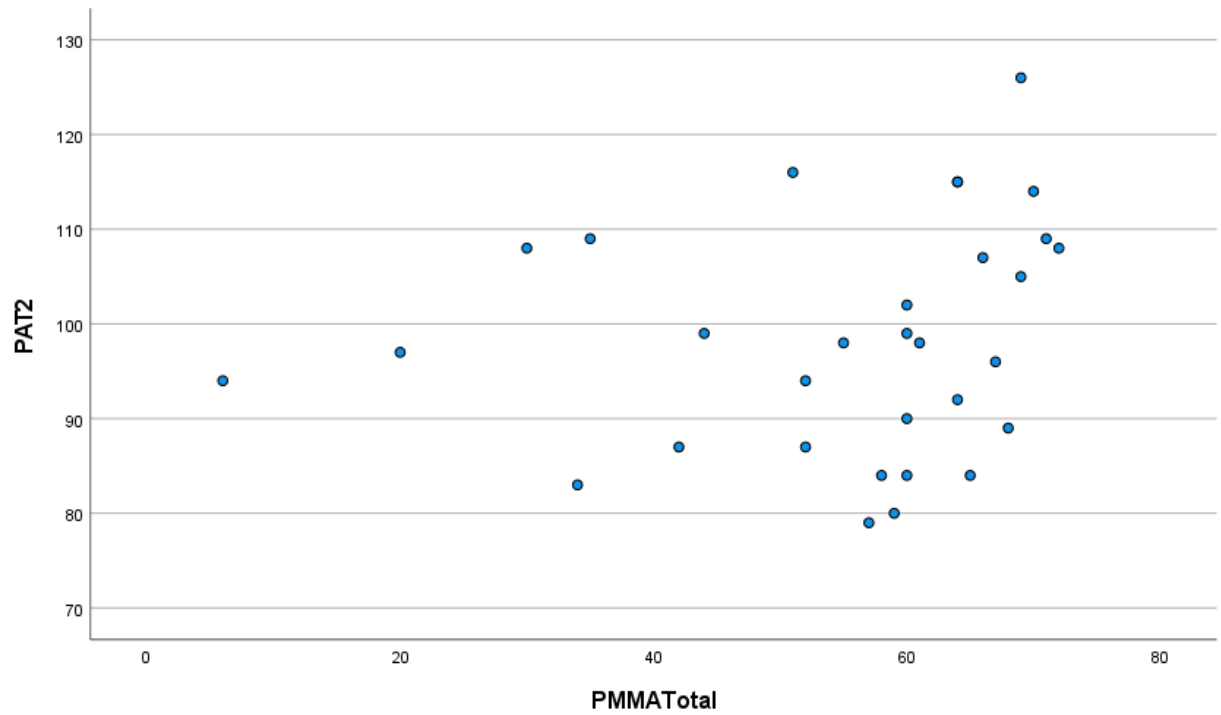
	Music Aptitude	Phonological Awareness in English	Morphological Awareness in English
Music Aptitude	1	.188	.183
Phonological Awareness in English		1	.493*
Morphological Awareness in English			1

\*  $p < .05$

A scatter plot reveals that there is a positive correlation between music aptitude and phonological awareness in English (see Figure 4.4); however, this relationship is not statistically significant ( $r = .188$ ,  $p = .312$ ) and considered small by Cohen's (1992) interpretation. The effect size of this relationship as measured by the coefficient of determination is weak in magnitude ( $R^2 = .035$ ) by Cohen's interpretation.

**Figure 4.4**

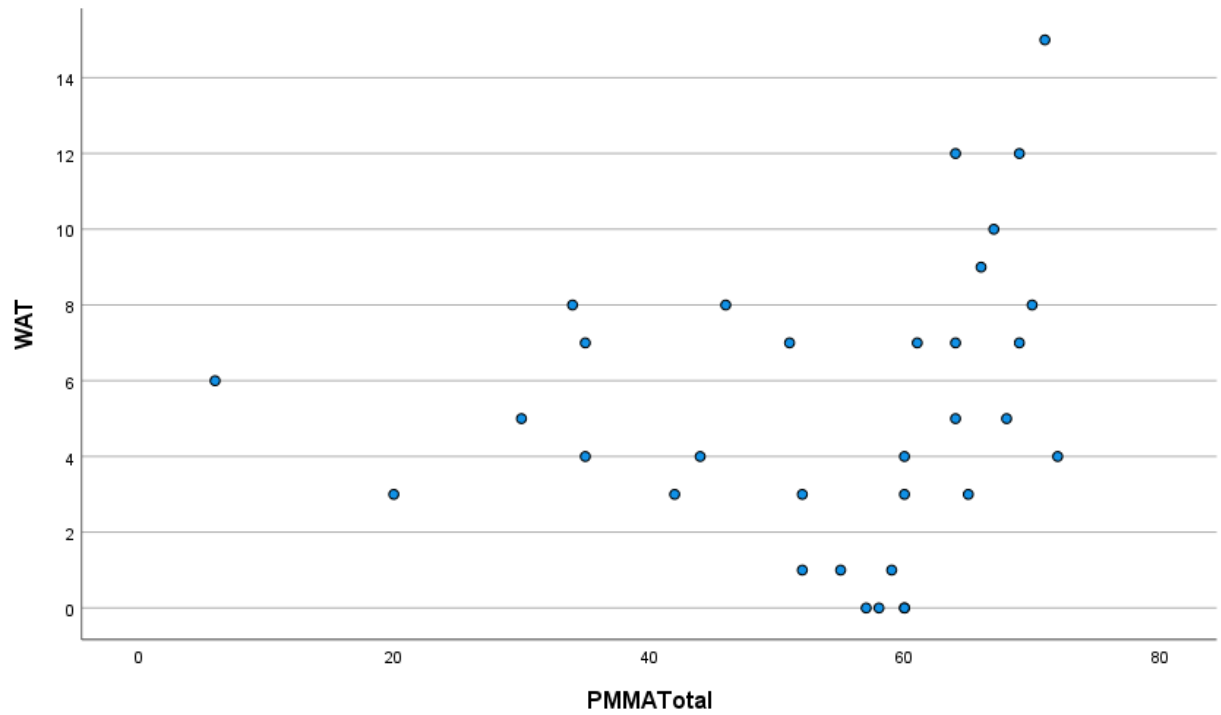
*Relationship Between Music Aptitude and Phonological Awareness in English*



A scatter plot reveals that there is a positive relationship between music aptitude and morphological awareness in English (see Figure 4.5); however, this relationship is not statistically significant ( $r = .183$ ,  $p = .309$ ) and considered small by Cohen's (1992) interpretation. The effect size of this relationship as measured by the coefficient of determination is weak in magnitude ( $R^2 = .033$ ) by Cohen's interpretation.

**Figure 4.5**

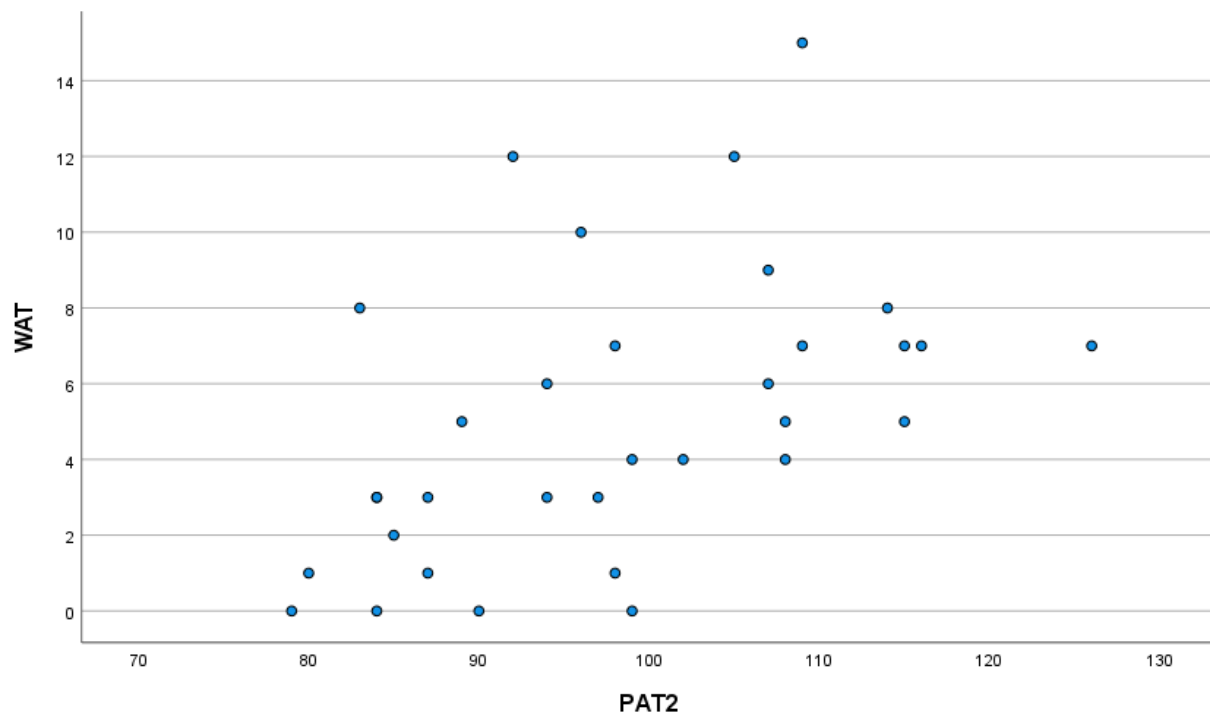
*Relationship Between Music Aptitude and Morphological Awareness in English*



A scatter plot reveals that there is a positive relationship between phonological awareness in English and morphological awareness in English (see Figure 4.6). This relationship is statistically significant ( $r = .493$ ,  $p = .004$ ) and considered medium by Cohen's (1992) interpretation. The effect size of this relationship as measured by the coefficient of determination is moderate in magnitude ( $R^2 = .243$ ) by Cohen's interpretation.

**Figure 4.6**

*Relationship Between Phonological Awareness in English and Morphological Awareness in English*



### **Cross-Linguistic Interactions in Music Aptitude**

The third research question asked what are the cross-linguistic relationships among music aptitude, phonological awareness, and morphological awareness in first grade Spanish-English emergent bilinguals in a mid-sized suburban school district in Texas on Spanish- and English-language measures? In order to understand these relationships, a Pearson product moment correlation was used. These relationships are shown in Table 4.4.

**Table 4.4**

*Correlations Among Music Aptitude, Phonological Awareness in English, Phonological Awareness in Spanish, Morphological Awareness in English, and Morphological Awareness in Spanish*

	Music Aptitude	Phonological Awareness in English	Phonological Awareness in Spanish	Morphological Awareness in English	Morphological Awareness in Spanish
Music Aptitude	1	.188	.380*	.183	-.123
Phonological Awareness in English		1	.725*	.493*	-.055
Phonological Awareness in Spanish			1	.354*	-.215
Morphological Awareness in English				1	-.107
Morphological Awareness in Spanish					1

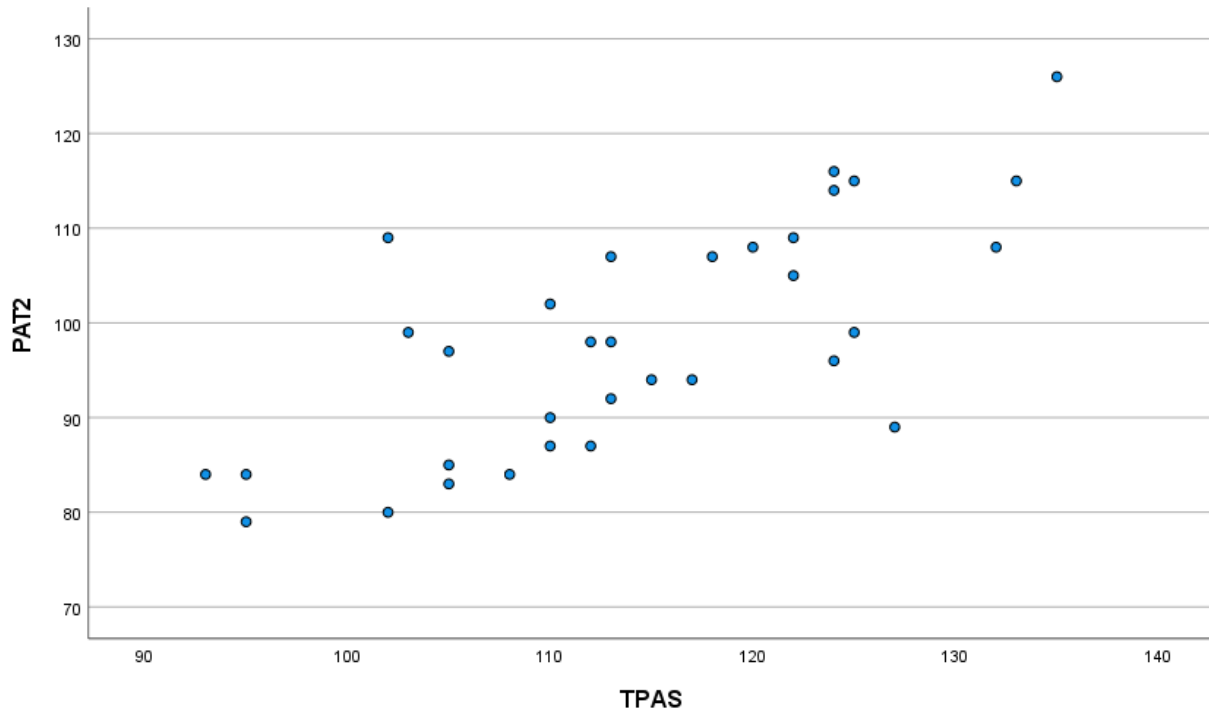
\*  $p < .05$

A scatter plot reveals that there is a positive relationship between phonological awareness in English and phonological awareness in Spanish (see Figure 4.7). This relationship is statistically significant ( $r = .725, p < .001$ ) and considered large by Cohen's (1992) interpretation. The effect size of this relationship as measured by the coefficient of determination is substantial in magnitude ( $R^2 = .526$ ) by Cohen's interpretation.



**Figure 4.7**

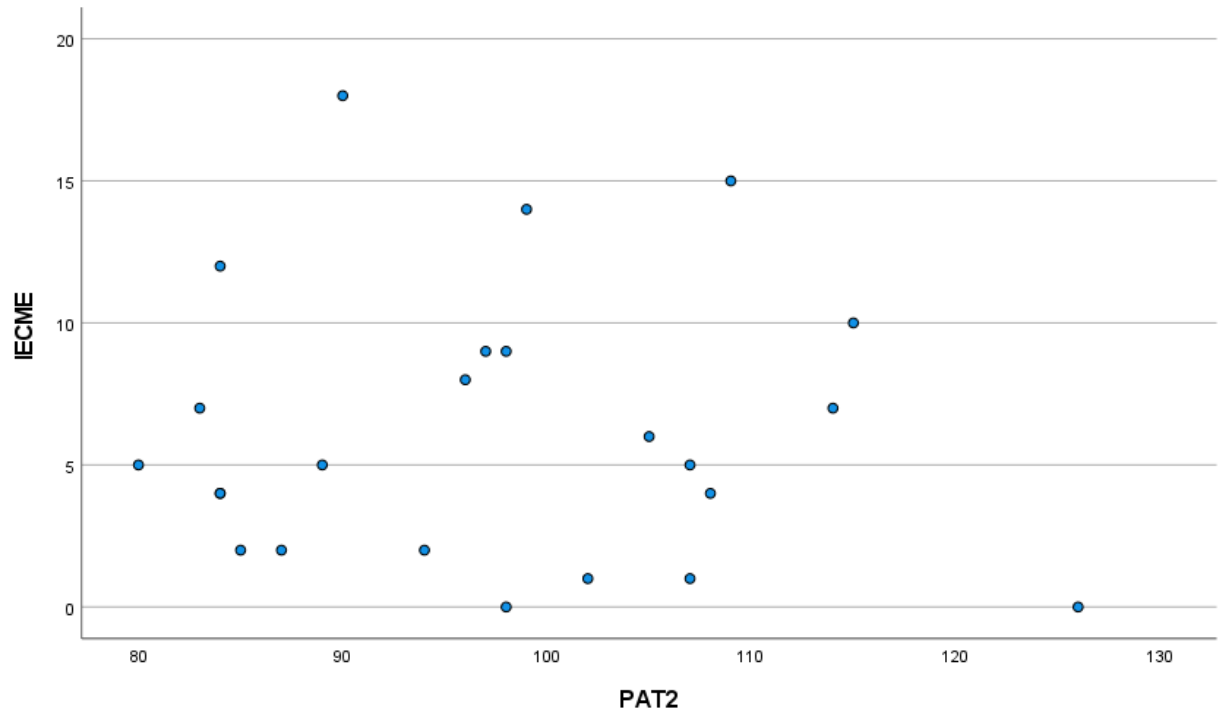
*Relationship Between Phonological Awareness in Spanish and Phonological Awareness in English*



A scatter plot reveals that there is no relationship between phonological awareness in English and morphological awareness in Spanish (see Figure 4.8). This relationship is not statistically significant ( $r = -.055$ ,  $p = .797$ ). The effect size of this relationship as measured by the coefficient of determination is very weak in magnitude ( $R^2 = .003$ ) by Cohen's (1992) interpretation.

**Figure 4.8**

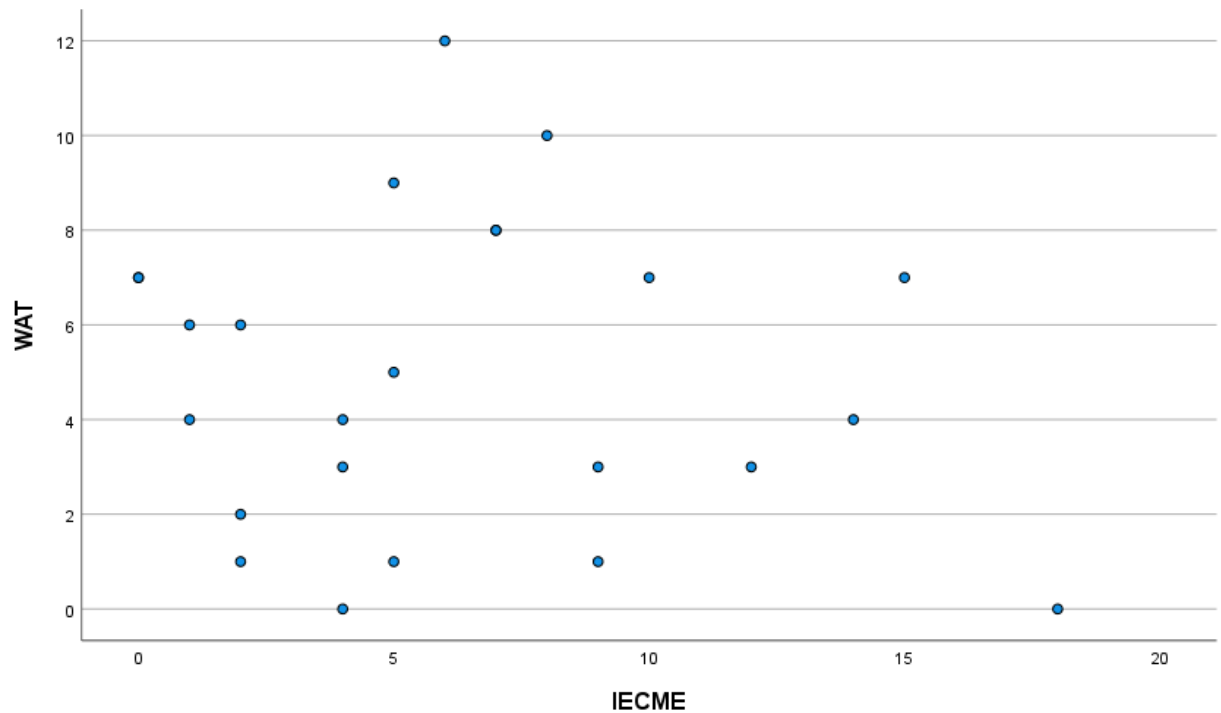
*Relationship Between Phonological Awareness in English and Morphological Awareness in Spanish*



A scatter plot reveals that there is no relationship between morphological awareness in English and morphological awareness in Spanish (see Figure 4.9). This relationship is not statistically significant ( $r = -.107$ ,  $p = .618$ ) and considered small by Cohen's (1992) interpretation. The effect size of this relationship as measured by the coefficient of determination is very weak in magnitude ( $R^2 = .011$ ) by Cohen's interpretation.

**Figure 4.9**

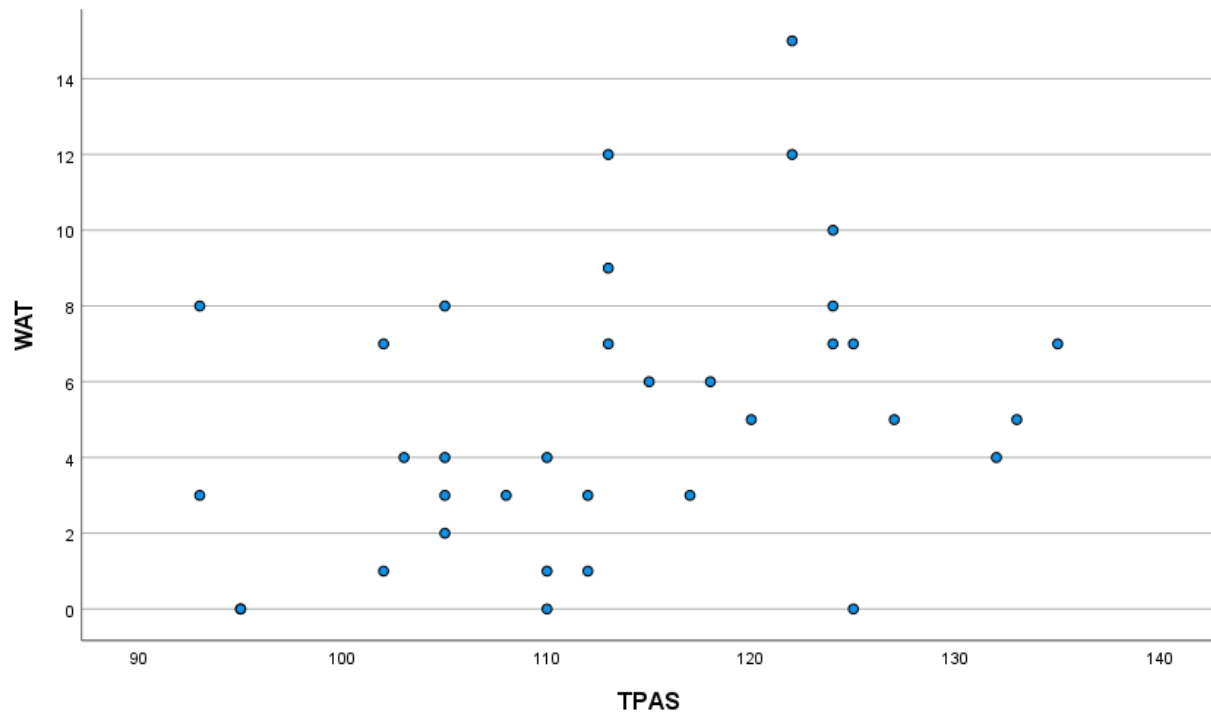
*Relationship Between Morphological Awareness in Spanish and Morphological Awareness in English*



A scatter plot reveals that there is a positive relationship between phonological awareness in Spanish and morphological awareness in English (see Figure 4.10). This relationship is statistically significant ( $r = .354, p = .037$ ) and considered medium by Cohen's (1992) interpretation. The effect size of this relationship as measured by the coefficient of determination is weak in magnitude ( $R^2 = .126$ ) by Cohen's interpretation.

**Figure 4.10**

*Relationship Between Phonological Awareness in Spanish and Morphological Awareness in English*



### Summary of Quantitative Findings

These data indicated numerous statistically significant relationships among music aptitude, phonological awareness in Spanish, phonological awareness in English, morphological awareness in Spanish, and morphological awareness in English. For Spanish-language measures, a statistically significant relationship between music aptitude and phonological awareness in Spanish was observed ( $r = .380, p = .029$ ). For English-language measures, a statistically significant relationship between phonological awareness in English and morphological awareness in English was observed ( $r = .493, p = .004$ ). In examining cross-linguistic relationships, two statistically significant relationships were observed: (1) the relationship between phonological awareness in Spanish and phonological awareness in English ( $r = .725, p$

< .001) and (2) the relationship between phonological awareness in Spanish and morphological awareness in English ( $r = .354, p = .037$ ). From here, qualitative data informed the quantitative data.

### **Qualitative Data: Writing Conferences**

After the initial phase of quantitative data collection, participant data were analyzed to determine which would make the best cases for further qualitative investigation to help explain the quantitative data, which aligns with the sequential, explanatory mixed methods research design (Creswell & Plano Clark, 2018). The research question that guided this portion of the study was: How do first grade Spanish-English emergent bilinguals in a mid-sized suburban school district in Texas embody music aptitude, phonological awareness, and morphological awareness in their writing and experiences?

Three participants were selected based on the criteria of being from one of these groups: (1) scoring high or low on particular measures, (2) scoring high on one measure but low on another measure, or (3) whose scores do not align with previous literature in regard to the relationship between phonological awareness and music aptitude or phonological awareness and morphological awareness. Participants without complete data were excluded from further analysis. From there, one student who scored the highest on the *PMMA* (the music aptitude measure), one student who scored the highest on the *IECME* (the morphological awareness in Spanish measure), and one student who scored typically on most tests except the *IECME* (the morphological awareness in Spanish measure) and *WAT* (the morphological awareness in English measure) were selected. All names are given as pseudonyms.

Data included a short writing conference in which participants talked about their writing in Spanish (one writing sample in Spanish and one in English). These conferences and their

writing samples served as cases from which data are drawn. Amount time spent with the child and the number of utterances, understood as conventional speech acts (Kissine, 2013), were given to understand the length of the writing conferences. These cases were analyzed using the a priori codes of music aptitude, phonological awareness, and morphological awareness (the three main quantitative variables). From there, in vivo coding was used to inform the initial codes and extended to second cycle coding to find subcategories within the initial coding scheme (see Table 4.5).

**Table 4.5**

*Coding Scheme for Data*

A Priori Codes	Initial Codes (1st Cycle)	Subcategories (2nd Cycle)
Music Aptitude	Music at home	Passive Listening
		Active Music Making
Phonological Awareness	Connecting Sound to Text	In Writing
		In Speech
Morphological Awareness	Translanguaging	Presence of Translanguaging
		Absence of Translanguaging

Initial data analysis indicated that all students exhibited some form of music aptitude, phonological awareness, and morphological awareness during their writing conference. However, some students demonstrated these through their spoken words while others expressed it through their written words. The following is a presentation of each of these cases and how

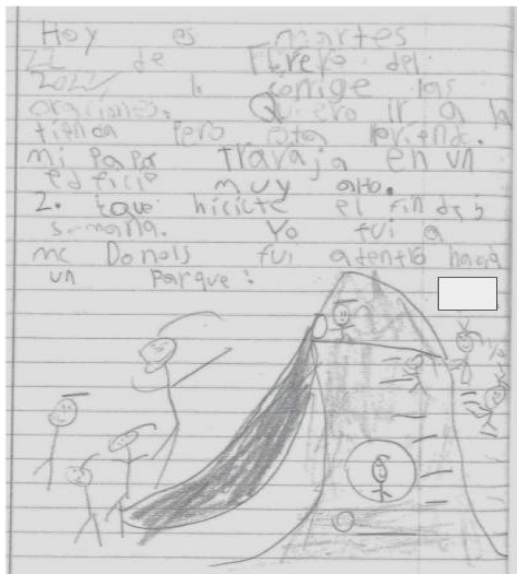
they embodied music aptitude, phonological awareness, or morphological awareness in their writing conferences.

### Case 1 - Carolina

The first case is Carolina, a female 6-year-old. She is a twin and one of two twin pairs within the study. This case was selected for qualitative analysis because she scored the highest on the music aptitude measure, the *PMMA*. Even though this case provided rich data in both her writing and her speaking, her speech provided all the coded data. While her writing samples did not yield any coded data, they are provided below (see Figures 4.11 & 4.12). During the writing conference, the child made 44 utterances, which lasted for 6 minutes and 57 seconds. The writing conference yielded data for the following codes: music at home: active music making, connecting sound to text: in speech, and the presence of translanguaging.

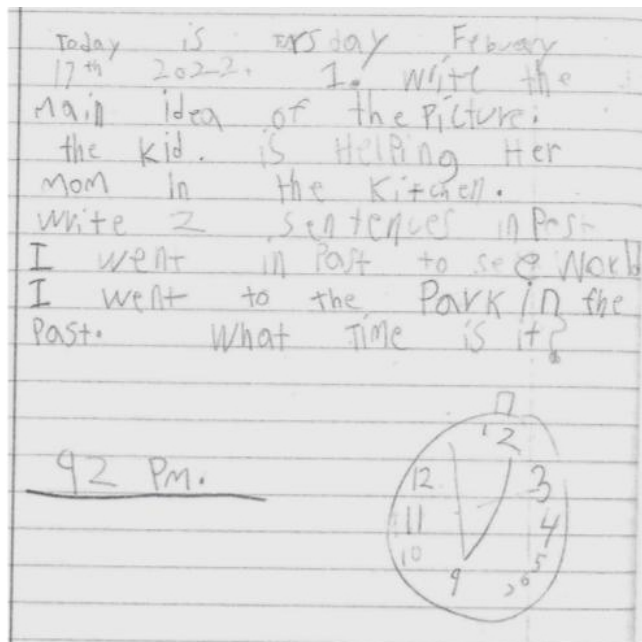
**Figure 4.11**

*Carolina's Writing Sample in Spanish*



**Figure 4.12**

*Carolina's Writing Sample in English*



***Music at Home: Active Music Making***

Carolina spoke the most utterances out of all three cases. Of those, she spoke eight utterances that dealt directly with making music in her home with an additional 10 during our conversation about music. Carolina indicated both active and passive music making; however, the majority of her examples were active. Carolina indicated how she listened to music rather than make it twice. The first was listening to her father play the guitar, “También mi papá tiene una guitarra. [Also, my dad has a guitar].” The second was in a description of what is at her church, “Mi iglesia hay... una gente [que] canta con instrumentos [At my church, there are people that sing with instruments].” While these instances indicate that Carolina has musical experiences that include passively listening to music, she also indicated that there were many active music making experiences in her life.



Her active music making experiences included playing instruments at home, singing at home, and at school. Carolina has many different musical instruments in her home, which give her multiple opportunities to create with music, “Yo tengo el ukulele, la trompeta, el piano, el tambor, la[s] maraca[s] de huevos y la pander[o] [I have a ukulele, a trumpet, a piano, a drum, egg shakers, and a tambourine].” During the writing conference, she nodded when asked, “¿Los tocas? [Do you play them?]” Additionally, she indicated that all of her family members sing, “Siempre cantamos [We always sing].” And when they do sing, they sing songs that are “como cristianas [like Christian ones].” Lastly, she indicated that she also hears music in school “en tu [her music teacher who is the researcher] cuarto [in your room].” In addition to her musical experiences, it seemed as if Carolina had additional experiences with language and culture that may have led to productive ways of expressing herself through language.

### ***Connecting Sound to Text: In Speech***

Of the 44 utterances, Carolina made four utterances that indicated she was connecting sound to text. Of those four utterances, there were two different episodes. One was her trying to remember a word and another was when she sounded out a word. Each of these episodes were coded as an embodiment of phonological awareness by connecting sound to text through speech. The first instance is when Carolina is trying to remember which animals she saw at SeaWorld:

Carolina: There was a whale...¿y cómo se llama? [There was a whale...and what was it called?]

Researcher: ¿Shamu? [Shamu]

Carolina: No el que tiene un ojo...um...que es blanco. [No, the one that has the eye...um...that is white]

Researcher: Oh...¿el beluga? [the beluga]

Carolina: No...empieza con “c” [pronounced seh in Spanish] [No...it starts with the letter c]

Researcher: El “c”...Ah...no me acuerdo...¿cetacean? [Ah...I don’t remember...cetacean?]

Carolina: Eh...pero es con la /k/ [pronounced as kuh] [Eh...but it is with the sound /k/]

As shown in the above interaction, Carolina had a deep understanding of how sound connects to text. While not remembered during the interaction, this child is likely referring to the word orca, which both has a “c” and the /k/ sound. She demonstrated understanding that “c” could make both the /s/ and /k/ sounds but that the word she was looking for had the /k/ sound.

Beyond connecting letters to sounds as an embodiment of her phonological awareness, Carolina also showed how she was able to work out pronouncing a word that she had heard using sounds. In her description of her church, she included what the pastor did during the worship service, “Él predi...ped...pedi...predica [He preaches].” This utterance demonstrates a deep understanding of how sounds and letters are related and how their order affects meaning in a word. She experiments with the sounds in the word to be able to say the word that she means. In the utterance immediately preceding this one, she says, “el pastor tiene...y nos habla [the pastor...has...and he talks to us].” While experimenting with the sounds of the words served as a way to understand which word she wanted to use, the episode about how the pastor uses words may also demonstrate an embodiment of morphological awareness because she understands that what the pastor did was not exactly talk but instead to preach.

### ***Translanguaging***

The meaning system, also called the morphological or semantic system, of language can be expressed through one’s morphological awareness. Of the 44 utterances, eight contained

instances of translanguaging. García (2009) described translanguaging as “multiple discursive practices in which bilinguals engage in order to make sense of their bilingual worlds” (p. 45). While the majority of the conversation occurred in Spanish, when Carolina read her writing in English, she did not attempt to translanguage and read it in the language expressed. However, she did go back to Spanish with the inclusion of an English phrase:

Carolina: In the past, I went to the park...and...I...oh....I went to the past to see...to SeaWorld.

Researcher: ¿SeaWorld? ¿Fuiste a SeaWorld? [SeaWorld? You went to Seaworld?]

Carolina: Sí. [Yes.]

Researcher: Dime de esto. [Tell me about that.]

Carolina: There was a whale...¿y cómo se llama? [There was a whale...and what is it called?]

In this episode, Carolina translanguages between Spanish and English in order to find meaning in her experiences at SeaWorld. Her writing was in English. SeaWorld is largely an English-language experience. With this, she used English to work through the name of the world; however, her linguistic repertoire included both English and Spanish, so she searched her repertoire for the specific kind of whale.

In addition to this episode, Carolina also recalled what she ate at SeaWorld:

Carolina: Yo comí papas fritas. [I ate french fries.]

Researcher: Cuando estaba oh comiste papas fritas? Ay! Eran sabrosas? [When you were there oh you ate french fries? Oh! Did they taste good?]

Carolina: Sí, y también un chips. [Yes, and also some chips.]

Researcher: Y un chips también? [Some chips also?]

Carolina: Sí...también. [Yes...also.]

Being that SeaWorld was likely a largely English-language experience, Carolina may have chosen to use the word “chips” to express what she ate because that was how it was presented in her experience. She uses part of her linguistic repertoire in English to express the meaning from her experience, which demonstrates a translingual morphological awareness because she is able to express herself using all of her linguistic repertoire.

Beyond her experience at SeaWorld, Carolina also utilized translanguaging as a strategy to express meaning when describing her church:

Mi iglesia hay muchos chairs muchísimas...y hay stairs...y tam...hay stairs...y hay un audience...y hay una cosa, una mesa donde pone la Biblia...y allí también es una gente canta con instrumentos y después el pastor tiene...y nos habla. [My church has many chairs, a lot...and there are stairs...and al...there are stairs...and there is an audience...and there is a thing, a table where you put the Bible...and over there also is some people who sing with instruments and later the pastor has...and he talks to us.]

During this episode she opted to use the words “chairs,” “stairs,” and “audience” in lieu of their Spanish equivalents: “sillas,” “escaleras,” and “audiencia.” This is not because she did not have the equivalent words as she chose to use “sillas” in another utterance, “después pone un montón de sillas como un audience [afterwards, they put a mountain of chairs as an audience].” In this same instance she continues to use the word “audience” instead of its Spanish equivalent. While the exact reason could not be understood, she had a reason for choosing to use particular ways of expressing herself translingually throughout our conversation, which demonstrated a deep understanding of morphological awareness not only in her named languages of English and Spanish but also from a translanguaging perspective.

## Case 2 - Maria Theresa

The second case is Maria Theresa, a 6-year-old female. This particular case was selected for qualitative analysis because she scored the highest on the morphological awareness in Spanish measure, the *IECME*. During the writing conference, Maria Theresa made 26 utterances, which lasted for 6 minutes and 44 seconds. While the number of utterances is fewer than Carolina, it should be noted that this child's responses were often lengthier than the other children. The writing conference yielded data for the following codes: music at home: passive listening, connecting sound to text: in writing, and the presence of translanguaging.

### *Music at Home: Passive Listening*

While Maria Theresa had fewer utterances than Carolina, she would talk for extended periods rather than making many shorter utterances. Of the 26 utterances, 10 dealt with music. Maria Theresa indicated that her musical experiences at home were mostly passive listening with her family. She connected her experience with music to her writing in this interaction about a particular song she listened to with her cousin:

Maria Theresa: Me gusta “Vamos a la playa.” [I like “We’re going to the beach.”]

Researcher: “¿Vamos a la playa?” ¿Esta canción? [“Let’s go to the beach?” This song?]

Maria Theresa: Uh...sí me gusta esta canción. [Uh...yes I like that song.]

Researcher: ¿Quién lo canta? [Who sings it?]

Maria Theresa: No sé, pero um solo por mi primo [NAME] también fue con nosotros y entonces puso el la tele “Vamos a la playa” en YouTube. [I don’t know, but um my cousin NAME also went with us and then put “Let’s go to the beach” on the TV on YouTube.]

Again, she expressed how she passively listened to music in a different place with different people:

Researcher: ¿En cuáles otros lugares en su casa puedes escuchar música? [In what other places in your house do you hear music?]

Maria Theresa: Hay escaleras y hay como un cuarto allí y tenemos que acostarnos y mamá y mi papá tienen que acostarse [mumbling] porque no había muchos um dormitorios. [There are stairs and there is like a room over there and we have to lay ourselves down and mom and my dad have to sleep [mumbling] because there are not many um bedrooms.]

Researcher: ¿Y allí pueden escuchar música? [And there you can listen to music?]

Maria Theresa: Uh huh. Hay una tele también en el piso que sólo hay que en este lado. [Uh huh. There is also a TV on that floor that is only on that side.]

Both episodes demonstrate that Maria Theresa interacts with music at home in a passive way through listening. While Maria Theresa may only passively interact with music, she takes an active role in her languaging, especially in her writing.

### ***Connecting Sound to Text: In Writing***

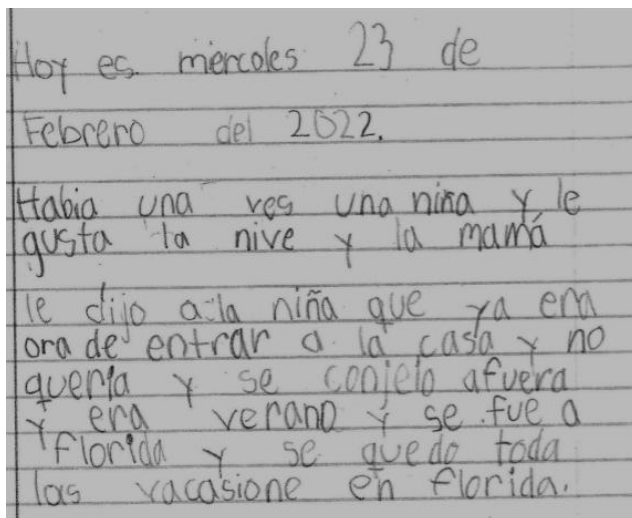
Maria Theresa did not talk through her phonological decisions in her writing, but rather saw the words in her writing expressing the desired meaning because they sounded like the speech she was replicating. In both of her writing samples, English and Spanish, she represented her speech using orthographic conventions, which demonstrated a deep understanding of both the phonological and orthographic systems of English and Spanish.

In her Spanish writing, she would often adjust the orthography in Spanish to reflect the way she said the words (see Figure 4.13). For example, instead of writing the word “vez” the

conventional way with an “z,” she chose to write it with an “s.” In her dialect of Spanish, these letters can correspond to the same sound /s/, so this shows a deep understanding of the connection between the phonology of her language and the orthography of writing. Another example is when she wrote, “ora” instead of “hora.” She indicated during her writing conference that it was the “hora” that means time, “del tiempo [the time one]” (In Spanish “ora” means s/he prays while “hora” means “hour”). Lastly, Maria Theresa connected her previous orthographic knowledge with the word “vacaciones” [vacation]. Her understanding that the “s” makes the /s/ sound helped her to create the word “vacasione.” Additionally, her dialect of Spanish often has final sounds of words left silent, which is what she chose to write when she left off the “s” in her writing of “vacaciones.”

#### **Figure 4.13**

##### *Maria Theresa’s Writing Sample in Spanish*



Beyond her understanding of how the sounds of Spanish connect to the orthography of Spanish, Maria Theresa connected the sounds of English to the orthography of English.

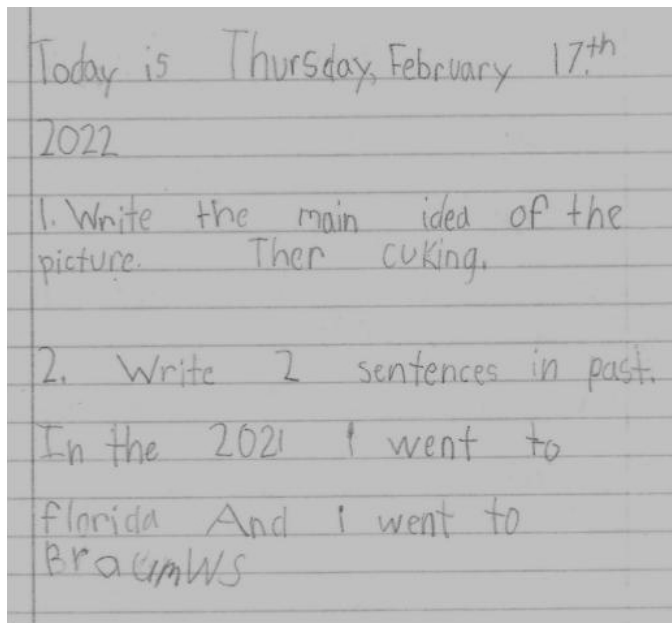
Contrasting her Spanish language writing sample which demonstrated her ability to write in the narrative style, her English writing sample was more direct and didactic (see Figure 4.14). Even though her English writing sample did not have as deep of a structure as her Spanish writing sample, the data still yielded examples of her embodiment of phonological awareness in English. One example is in her representation of the word “cooking.” Her phonological awareness indicated that the second sound in that word is /ʌ/, which is often expressed in English orthography as “u.” Hence, her construction of “cooking” as “cuking.” Additionally, she took the contraction “they’re” and spelled it phonetically, “ther.”

While both Spanish and English orthographies seemed to have been compartmentalized for Maria Theresa, one example stands out as possibly expressing a cross-linguistic understanding of phonology and orthography. The aforementioned example from the writing sample in Spanish detailing how she spelled “hora [hour]” as “ora.” In English, this letter is often silent. Because of this, this participant may have chosen to omit the letter to align with the phonology of the word or it may have been because she was demonstrating her awareness of multiple orthographies at the same time. While this example is ambiguous in demonstrating if cross-linguistic transfer is present in the writing sample, this child’s conversation during the writing conference indicated her ability to use translanguaging to express meaning.



**Figure 4.14**

*Maria Theresa's Writing Sample in English*



### ***Translanguaging***

As mentioned above, translanguaging is the “multiple discursive practices in which bilinguals engage in order to make sense of their bilingual worlds” (García, 2009, p. 45). This meaning-making relates directly to the semantic or morphological system of language, which is expressed through morphological awareness. Of the 26 utterances, four instances of translanguaging were found. No clear examples of translanguaging were present in Maria Theresa’s writing.

The first instance of translanguaging occurred when she was describing what she needed to write about in English, “Decidiremos que teníamos es que había una como una foto tiene una señora y un hombre y estaba con y era y estaba como con un vaso [not understood by researcher] y eran cooking [We will decide that we needed to it’s that there was like a photo that had a woman and a man and they were with and they were y they were like with a glass [not

understood by researcher] and they were cooking].” It seems as if the written text guided Maria Theresa’s speech because the word cooking was present in both the writing and the speech (see Figure 4.14). She may have chosen to language in this way because she was connecting the meaning in her speech to the meaning in her writing.

Another instance of translanguaging that connected her speech to her writing was in her explanation of the year in her English writing sample. In both examples, she wrote the years using numerals; however, when she discussed the years she would language in mostly Spanish but express the year in English:

Researcher: ¿Fuiste a Florida [mmhmm] de vacaciones? Como escribiste de vacaciones ¿de verdad fuiste a Florida? [Did you go to Florida for vacation? You wrote about vacation. Did you really go to Florida?]

Maria Theresa: Mmhmm. En twenty twenty-one. [In twenty twenty-one.]

She may have chosen to language in this way because in school, she is learning mathematics in English, which would connect this portion of her linguistic repertoire to English rather than Spanish. In order for her to make meaning, she expresses numbers in English because that is the experience of her bilingual life.

The last instance of translanguaging as representation of morphological awareness is when she discussed her aunt and uncle in Florida and how they had pug puppies in their cars:

Researcher: Oh [la casa] de tu tío. [Oh, your uncle’s house.]

Maria Theresa: Sí, que se llama Chu-Chu. [Yes, whose name is Chu-Chu.]

Researcher: Chu-Chu. Okay tu tío Chu-Chu. Que bien, pues... [Chu-Chu. Okay, your uncle Chu-Chu. Good, well...]

Maria Theresa: y [uhuh] y cuando ya era cuando era febrero umum mi tío Mino tenía que [not understood] el carro de mi tía que se llama Pepe y entonces a dentro de su carro había pugs. [and...and when it was when it was February umum my uncle Mino had to [not understood] my aunt's car whose name is Pepe and then inside her car there were pugs.]

Researcher: Oh pugs. Los perros. [Oh pugs. The dogs.]

Maria Theresa: Uh huh. Los babies. [Uh huh. The babies.]

Instead of using “doguillo,” the Spanish word for “pugs,” the child chose to language using the English term. While some might see this as lack of language, I would counter with the next example in this episode dealing with how she referred to them as “babies” instead of using the Spanish term “bebés” [babies] or even “cachorros” [puppies]. This may demonstrate how she is making a connection to meaning in her bilingual world through translanguaging.

### **Case 3 - Antonio**

The last case is Antonio, a 7-year-old male. He was chosen because he obtained one of the highest scores on the *IECME*, the morphological awareness in Spanish measure, yet also scored the lowest scores on the *WAT*, the morphological awareness in English measure. These data do not align with previous research that suggests a cross-linguistic transfer in morphological awareness (Ramirez et al., 2009). During the writing conference, which lasted 6 minutes and 57 seconds, Antonio made 23 utterances. It should be noted that Antonio made the fewest utterances and that his responses were usually only a few words unless he was reading from his writing. The writing conference yielded data for the following codes: music at home: passive listening, connecting sound to text: in writing, and the absence of translanguaging.

### ***Music at Home: Passive Listening***

Most utterances from Antonio had to deal with how he interacted with music at home. Of the 23 utterances, 14 dealt with his musical activities at home. Like Maria Theresa, Antonio interacted with music through passive listening:

Researcher: ¿Qué haces con la música en la casa? [What do you do with music in your house?]

Antonio: Nada. [Nothing.]

Researcher: ¿Nada? ¿No se oye música por nada? [Nothing? You don't hear music anywhere?]

Antonio: Sólo música y ya. [Only music and that's it.]

Researcher: Uh huh. ¿Cómo? ¿Dónde? ¿En la televisión? ¿En el radio? ¿Dónde? [Uh huh. How? Where? On the television? On the radio? Where?]

Antonio: En la en el radio. [On the on the radio.]

Researcher: En el radio. ¿Qué tipo de música? [On the radio. What type of music?]

Antonio: No sé cual. [I don't know which one.]

Researcher: ¿Es música con palabras o no? [Is it music with words or no?]

Antonio: Sí. [Yes.]

Researcher: Sí y de la música con palabras, ¿en cuál lengua está? [Yes and the music with words, what language is it in?]

Antonio: Español.[Spanish.]

This episode demonstrates that Antonio engages with music passively by listening to the radio, yet he did have a model in his house of active music making in his mother.

Antonio reported positive feelings toward singing as an activity that was fun:

Researcher: ¿Alguien canta en tu casa? [Does someone sing in your house?]

Antonio: U-hum.

Researcher: ¿Sí? ¿Quién? [Yes? Who?]

Antonio: Mi mamá. [My mom.]

Researcher: ¿Qué canta? [What does she sing?]

Antonio: No sé que canta. No sé cómo se llama la canción. [I don't know what she sings. I don't know what the song is called.]

Researcher: ¿Puedes cantarlo? [child shakes head] ¿No? No te acuerdas pero ¿sí te acuerdas cuándo canta en casa? [Can you sing it? No? You don't remember but do you remember when she sings at your house?]

Antonio: Cuando son las cinco mi mamá se pone a cantar. [When it's five o'clock my mom starts to sing.]

Researcher: Son las cinco de la tarde. ¿Para qué canta? [At five in the afternoon. Why does she sing?]

Antonio: No sé para que. [I don't know why.]

Researcher: ¿Para divertirse divertirse como así? [To have fun have fun like that?]

Antonio: Divertirse. [To have fun.]

Antonio connects the positive feelings with singing to how he believes his mother feels when she sings. While Antonio did not express how he actively engaged in music, he indicates that his mother actively engages with singing on a daily basis.

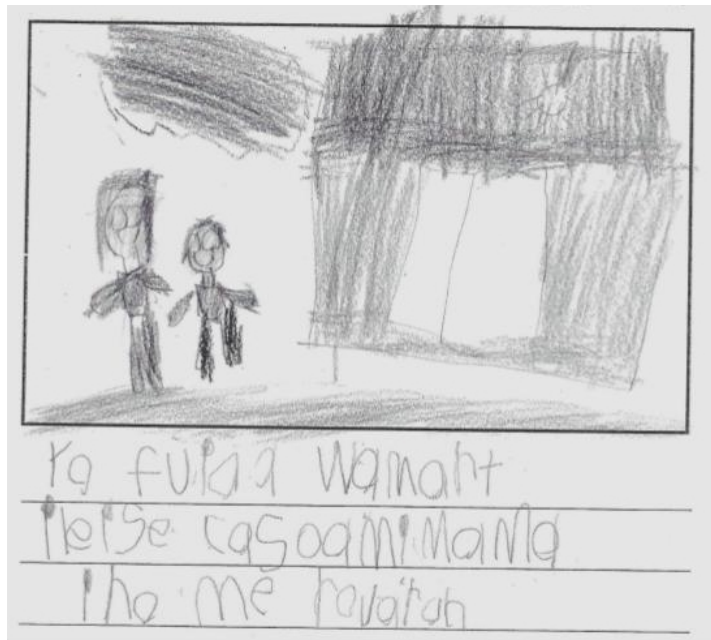
### ***Connecting Sound to Text: In Writing***

Antonio had very few utterances about his writing; however, his writing yielded many instances of representations of phonological awareness. In his writing, Antonio embodied his phonological awareness through the use of graphemes that represented the sounds he heard when saying a word. Additionally, he utilized cross-linguistic phonological awareness in his orthography.

In his Spanish writing sample (see Figure 4.15), Antonio constructed words in a way that reflected the way he spoke. For example, at the beginning of lines two and three, he starts with “i,” which is his graphic representation of the Spanish word “y” [and]. The phonology of these two representations is identical and makes phonological sense as both graphemes represent the /i/ sound. Beyond this, in line three he writes “i no me rovaron” to represent “y no me robaron” [and they didn’t steal me] in reference to children being stolen at the local Walmart for not listening to their parents. The sound /β/ can be represented as “b” or “v” in Spanish depending on certain orthographic rules. Again, Antonio shows how he understands this by applying his understanding of letter-sound correspondence in Spanish by applying a grapheme that makes phonological sense. Lastly, in line two, he writes, “i le ise caso a mi mama,” which is his representation of “y hice caso a mi mamá” [and I listened to my mother]. This represents his understanding that the /s/ sound can be written as “s” instead of “c.” Beyond his understanding of Spanish phonology as applied to Spanish orthography, he also extends this knowledge to his English writing.

**Figure 4.15**

*Antonio's Writing Sample in Spanish*

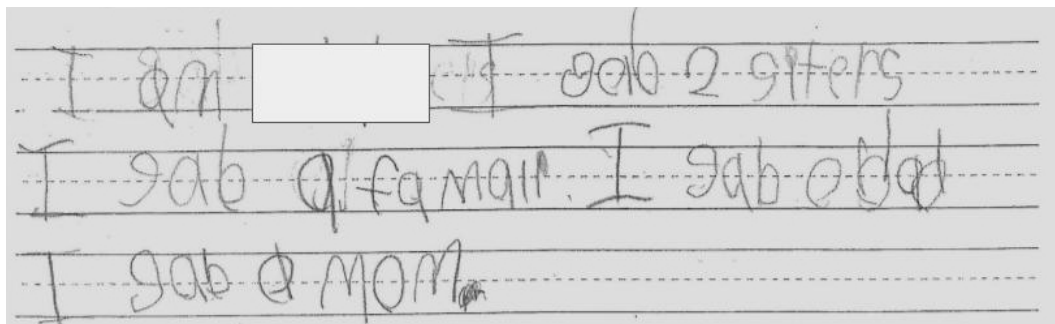


In his English writing sample (see Figure 4.16), Antonio demonstrates how he applies his knowledge of Spanish orthography to his English writing, which may demonstrate a cross-linguistic understanding between the phonologies and orthographies of English and Spanish. The first example of cross-linguistic application of Spanish orthography is in his representation of the word “have.” Antonio pronounces “have” as /xab/. In Spanish orthography, the /x/ sound can be represented by the following graphemes: “h,” “g,” “j,” and “x.” He may have chosen the “g” because it is by far the most common representation in Spanish orthography. It makes sense that he would choose to represent “have” as “gab” because it reflects the way he says the word. Also, he extends his cross-linguistic phonological awareness through his representation of “family” as “famili.” As previously discussed, in Spanish orthography the sound /i/ can be represented as either “i” or “y,” but the grapheme “i” is more common and reflects how this child more

commonly represents the sound. While Antonio has demonstrated deep cross-linguistic understanding in his application of his phonological awareness to his orthographic knowledge, it did not mean a direct connection to other language systems such as in his morphological awareness.

**Figure 4.16**

*Antonio's Writing Sample in English*



### ***The Absence of Translanguaging***

One unique feature of Antonio's was that he chose to compartmentalize his English and Spanish language production in regard to meaning making. While he did show deep cross-linguistic understanding of the phonologies and orthographies in Spanish and English as discussed previously, he consistently engaged in expressing meaning through one language at a time. This may be explained by connecting these qualitative data with the quantitative data as follows.

### **Mixed Data: Explaining the Quantitative Data**

Continuing with a sequential, explanatory mixed methods design, the qualitative data helped to explain the quantitative data. This section of the study focused on the following research question: how can the writing and experiences of first grade Spanish-English emergent



bilinguals in a mid-sized suburban school district in Texas explain the relationships among music aptitude, phonological awareness, and morphological awareness in English and Spanish for first grade Spanish-English emergent bilinguals in a mid-sized suburban school district in Texas?

The qualitative data presented within each case is presented alongside that particular case's quantitative data and the overall quantitative data in order to demonstrate an explanation as to why these data may align in this way. Overall quantitative data with effect sizes are presented in Table 4.6.

**Table 4.6**

*Correlation Coefficients of All Relationships With Effect Sizes*

	Music Aptitude	Phonological Awareness in English	Phonological Awareness in Spanish	Morphological Awareness in English	Morphological Awareness in Spanish
Music Aptitude	1	$r = .188$ $R^2 = .035$	$r = .380^*$ $R^2 = .144$	$r = .183$ $R^2 = .033$	$r = -.123$ $R^2 = .015$
Phonological Awareness in English		1	$r = .725^*$ $R^2 = .526$	$r = .493^*$ $R^2 = .243$	$r = -.055$ $R^2 = .003$
Phonological Awareness in Spanish			1	$r = .354^*$ $R^2 = .126$	$r = -.215$ $R^2 = .046$
Morphological Awareness in English				1	$r = -.107$ $R^2 = .011$
Morphological Awareness in Spanish					1

\*  $p < .05$

These data indicate that there are statistically significant relationships between (1) music aptitude and phonological awareness in Spanish, (2) phonological awareness in English and phonological awareness in Spanish, (3) phonological awareness in English and morphological awareness in English, and (4) phonological awareness in Spanish and morphological awareness in English. Each of these can be explained through qualitative data. Additionally, the relationships that were not statistically significant may also be able to be explained through this data. The relationships between music aptitude and phonological awareness in English and music aptitude and morphological awareness in English are explained through the qualitative data. All relationships with morphological awareness are explained through qualitative data related to the *IECME*.

### **Music Aptitude and Phonological Awareness in Spanish**

The quantitative data indicated that there was a statistically significant, medium-sized relationship between music aptitude and phonological awareness in Spanish ( $r = .380, p < .05, R^2 = .144$ ). The data that best explains this phenomenon is from Carolina. The quantitative data from Carolina indicates that she scored more than one standard deviation above the mean on both the music aptitude and phonological awareness in Spanish measures (see Table 4.7). The qualitative data from Carolina can aid in the explanation of how she embodied this relationship.

**Table 4.7***Carolina's Quantitative Data*

Test	Raw Score	z-score
<i>PMMA</i>	72	+ 1.140
<i>PAT-2</i>	108	+0.807
<i>WAT</i>	4	-0.308
<i>TPAS</i>	132	+1.632
<i>IECME</i>	4	-0.531

One thing that distinguishes Carolina from the other two cases is that she scored high on the music aptitude and phonological awareness in Spanish tests while the other two cases scored above the mean on one test and below the mean on the other. This might be due to the fact that Carolina reported active music making experiences at home, at school, and at her place of worship while Maria Theresa and Antonio only reported passive music making experiences such as listening to music. Additionally, Carolina consistently reported her understanding of phonology during the writing conference not through her writing but through her use of speech to understand the ways words are constructed. The example of her word work with the word “predica” [preach] reported in the previous section serves as evidence of this.

### **Phonological Awareness in English and Phonological Awareness in Spanish**

The quantitative data indicated that there was a statistically significant, large relationship between phonological awareness in English and phonological awareness in Spanish ( $r = .380$ ,  $p < .001$ ,  $R^2 = .526$ ). The data that best explains this is from Antonio. The quantitative data from Antonio indicates that this individual scored below the mean on both the phonological awareness in English and the phonological awareness in Spanish tests (see Table 4.8). Additionally,

Carolina scored above the mean for both the phonological awareness in English and phonological awareness in Spanish measures (see Table 4.7). However, the qualitative data from Antonio can help to explain how he embodied this relationship.

**Table 4.8**

*Antonio's Quantitative Data*

Test	Raw Score	z-score
<i>PMMA</i>	60	+0.360
<i>PAT-2</i>	90	-0.672
<i>WAT</i>	0	-1.386
<i>TPAS</i>	110	-0.292
<i>IECME</i>	18	+1.809

While both Carolina and Antonio quantitatively demonstrate the relationship between phonological awareness in English and phonological awareness in Spanish, Antonio's example contains the richest data that help to explain this relationship. While Antonio did not produce spoken data that indicated his understanding of phonological awareness, his writing was rich in data. Phonology and orthography are deeply related in Spanish. With this, Antonio would often borrow from his knowledge of Spanish phonology and orthography in his English writing (see Figure 4.16). For example, he would represent "family" with "famili" because his understanding of how to write the sound /i/ connected it to the letter "i." Additionally, he would use his pronunciation of the word "have," which was /xab/, in order to spell the word in English while borrowing Spanish orthography as "gab."

While Antonio's example contained the most instances of the relationship between phonological awareness in English and phonological awareness in Spanish, Carolina's example also offered an explanation. In her explanation of the whale from Seaworld, she noted that the name of the whale had a "c" in it, but it produced the /k/ sound. She had a thorough understanding of how the letter "c" could produce multiple sounds, so she made sure that I knew which sound "c" could make.

### **Phonological Awareness in English and Morphological Awareness in English**

Beyond the relationship between phonological awareness in English and phonological awareness in Spanish, phonological awareness in English has a statistically significant, medium-sized relationship with morphological awareness in Spanish ( $r = .493, p < .05, R^2 = .243$ ). The data that best explain this relationship is from the qualitative data from Carolina. While her individual quantitative data do not align with this relationship, her use of translanguageing may suggest that she is beginning to make the connection between the phonology and morphology of English.

Carolina translanguageed often during her writing conference. One instance is how she referred to the chairs at her church. At first, she talked about them as "chairs" using the English word while later in the conversation, she moved to the Spanish word for "chairs," "sillas." This could be seen as a demonstration of her understanding of English morphology. Beyond this, Carolina also connected English phonology with her attempt to recall the name of the whale at Seaworld. While these qualitative data may not support a strong argument that this participant embodied the relationship between phonological awareness in English and morphological awareness in English, it may be due to the sampling of the qualitative participants that did not yield the data necessary to explain all the observed phenomena.

### **Phonological Awareness in Spanish and Morphological Awareness in English**

To extend the understanding of the relationships with morphological awareness in English, these data indicated a statistically significant, small relationship between phonological awareness in Spanish and morphological awareness in English ( $r = .354, p < .05, R^2 = .126$ ). These data might be best explained by the qualitative data from Antonio. He scored below the mean on both the phonological awareness in Spanish and morphological awareness in English tests (see Table 4.8).

Because there is a strong relationship between phonological awareness in Spanish and phonological awareness in English ( $r = .380, p < .001, R^2 = .526$ ), the explanation from that section may serve to understand the relationship between phonological awareness in Spanish and morphological awareness in English. Antonio scored below the mean for both phonological awareness in Spanish and morphological awareness in English (see Table 4.8), yet his understanding of Spanish phonology helps him to understand English morphology.

Antonio demonstrates a deep understanding of Spanish phonology and orthography in his writing. One instance is from his Spanish writing (see Figure 4.15) where he connects the sound that the graphemes “y” and “i” make as the same, /i/. Additionally, he applies this knowledge to his writing in English where he uses the grapheme “i” in the same way he does in Spanish writing the word “family” as “famili” (see Figure 4.16). He can translate his understanding of Spanish phonology and orthography to his understanding of morphology, or meaning, in English.

### **Music Aptitude and Phonological Awareness and Morphological Awareness in English**

The remaining relationships were not statistically significant; however, the qualitative data may serve as a means to understand why that may be so. These data indicate the relationship

between music aptitude and phonological awareness in English is not statistically significant ( $r = .188, p = .312, R^2 = .035$ ) and the relationship between music aptitude and morphological awareness in English is not statistically significant ( $r = .183, p = .309, R^2 = .033$ ). This may be explained by the way in which these children are developing English as an additional language. Maria Theresa demonstrates in her writing that she uses a very didactic approach to her understanding of English writing (see Figure 4.14). Most of the writing is her copying the questions while the rest is a short response to the question. Additionally, as previously discussed, Antonio consistently demonstrates a deep understanding of Spanish phonology through his knowledge of Spanish orthography by using his knowledge of Spanish to inform his writing in English.

### **The Relationships with Morphological Awareness in Spanish**

All relationships with morphological awareness in Spanish were not statistically significant. The quantitative data from Maria Theresa best explains why this might be so (see Table 4.9). Maria Theresa scored the highest (almost three standard deviations above the mean) on the morphological awareness in Spanish test, yet her remaining quantitative measures do not align with this. The best explanation for this may come from how the children responded to the *IECME*, the morphological awareness in Spanish measure. No student was able to complete the test either due to not understanding the content or tiring and then refusing to continue. This may have impacted the validity and reliability of the test with this particular population, which would explain why no relationships were detected, which does not align with the literature. Upon further analysis of the *IECME* it may be that the measurement tool was impacted by the treatment. González Sánchez and García Sánchez (2007a) indicated that the treatment they used

when measuring with the *IECME* were directly related, which may have created the testing threat to internal validity (Shadish et al., 2001).

**Table 4.9**

*Maria Theresa's Quantitative Data*

Test	Raw Score	z-score
<i>PMMA</i>	52	-0.160
<i>PAT-2</i>	94	-0.344
<i>WAT</i>	3	-0.577
<i>TPAS</i>	117	+0.320
<i>IECME</i>	24	+2.812

### Summary

The quantitative data indicated statistically significant relationships (1) between music aptitude and phonological awareness in Spanish, (2) between phonological awareness in English and phonological awareness in Spanish, (3) between phonological awareness in English and morphological awareness in English, and (4) between phonological awareness in Spanish and morphological awareness in English. These data also indicated that there were not statistically significant relationships between (1) music aptitude and phonological awareness in English, (2) music aptitude and morphological awareness in English, (3) music aptitude and morphological awareness in Spanish, (4) phonological awareness in Spanish and morphological awareness in Spanish, (5) phonological awareness in English and morphological awareness in Spanish, and (6) morphological awareness in Spanish and morphological awareness in English.



From the quantitative data, three cases in which participants scored well above the mean on at least one measure were selected to provide qualitative data through a writing conference. These data helped to explain the quantitative data. Qualitative data included a writing conference with a recorded conversation, a writing sample in Spanish, and a writing sample in English from Carolina, Maria Theresa, and Antonio. These data were coded with the a priori codes of music aptitude, phonological awareness, and morphological awareness. From here, the first cycle codes of music at home, connecting sounds to text, and translanguaging emerged. After the second cycle, subcategories for each code included (1) passive listening and active music making for music at home, (2) in writing and in speech for connecting sounds to text, and (3) the presence of and absence of translanguaging.

The qualitative data were then analyzed to see how they could explain the quantitative data. Disaggregated quantitative data, transcripts from the writing conference, the Spanish writing sample, and the English writing sample served as the data points used to explain the overall quantitative findings. Evidence is provided for the following statistically significant relationships: (1) music aptitude and phonological awareness in Spanish, (2) phonological awareness in English and phonological awareness in Spanish, (3) phonological awareness in English and morphological awareness in English, and (4) phonological awareness in Spanish and morphological awareness in English. Music aptitude and its relationship with phonological awareness and morphological awareness may not have been statistically significant because these students were still developing English as an additional language. Lastly, due to the lack of validity and reliability for the *IECME* for this population, none of the relationships with morphological awareness in Spanish were statistically significant.

## CHAPTER V

### DISCUSSION

The purpose of this study was to understand the relationships among music aptitude, phonological awareness in Spanish, phonological awareness in English, morphological awareness in Spanish and morphological awareness in English among first grade, Spanish-English emergent bi/multilingual students in a mid-sized suburban public school in Texas. The following questions that guided this study were:

1. What relationships exist among music aptitude, phonological awareness, and morphological awareness in first grade Spanish-English emergent bilinguals in a mid-sized suburban school district in Texas on English-language measures?
2. What are the relationships among music aptitude, phonological awareness, and morphological awareness in first grade Spanish-English emergent bilinguals in a mid-sized suburban school district in Texas on Spanish-language measures?
3. What are the cross-linguistic relationships among music aptitude, phonological awareness, and morphological awareness in first grade Spanish-English emergent bilinguals in a mid-sized suburban school district in Texas on Spanish- and English-language measures?
4. How do first grade Spanish-English emergent bilinguals in a mid-sized suburban school district in Texas embody music aptitude, phonological awareness, and morphological awareness in their writing and experiences?
5. How can the writing and experiences of first grade Spanish-English emergent bilinguals in a mid-sized suburban school district in Texas explain the relationships among music aptitude, phonological awareness, and morphological awareness in

English and Spanish for first grade Spanish-English emergent bilinguals in a mid-sized suburban school district in Texas?

The findings indicate that these data help to both support and question previous research. They support the research by aligning with previous studies connecting music aptitude and phonological awareness (Gordon et al., 2015; Standley, 2008) and connecting phonological awareness with morphological awareness (Carlisle, 2003, 2010). They question previous research because the present study's data do not always align with these observations. The observed relationship between music aptitude and phonological awareness in English did not support previous research (Gordon et al, 2015; Standley, 2008). The observed relationship between morphological awareness in Spanish did not align with previous research as well (Kieffer & Lesaux, 2008). However, some of the issues may lie in the selection of measurement tools. The contributions to research in the fields of music aptitude, the relationship between music aptitude and phonological awareness, the relationship between phonological awareness and morphological awareness, and the phenomenon of cross-linguistic transfer of phonological awareness and morphological awareness are presented. Further, the addition of children's voices in the research literature adds depth to how these phenomena are understood. Implications for music education, bi/multilingual education, early literacy, and assessment are given.

### **Contributions**

This study adds to the body of knowledge regarding music aptitude, the relationship between music aptitude and phonological awareness, the relationship between phonological awareness and morphological awareness, and the phenomenon of cross-linguistic transfer of phonological awareness and morphological awareness even though some of the results were not statistically significant or did not have large effect sizes detected. For the most part, these

phenomena align with previous research; however, some relationships do not align with previous research. Possibilities for why these data either align or do not align with previous research are given.

### **Music Aptitude**

Music aptitude is a developmental aptitude during childhood that comprises both tonal and rhythmic perception (Cutietta, 1991). The *PMMA* seems to be a valid and reliable measurement tool for first grade emergent bi/multilingual children in mid-sized suburban school districts in Texas. This extends our current understanding of the *PMMA* as a valid and reliable measurement tool in the United States to a more linguistically diverse population than the midwestern United States (Gordon, 1986a).

### **Music Aptitude and Phonological Awareness**

Beyond ascertaining validity and reliability for this population, additional evidence for the relationship between music aptitude and phonological awareness is present. While there was not a statistically significant relationship between music aptitude and phonological awareness in English, there was a statistically significant, medium-sized relationship between music aptitude and phonological awareness in Spanish. In regard to English, these data do not support findings from previous research that indicate a relationship between music aptitude and phonological awareness (Culp, 2017; Forgeard et al., 2008; Gromko, 2005; Lanthorum, 2011; Moritz et al., 2013; Peynircioğlu et al., 2002; Reifinger, 2018; Robinson, 2010). This may be due to the developing English language ability of these children. These data confirm the relationship Herrera et al. (2011) documented; however, the present study refutes the evidence provided by Abello et al. (2014).

While Abello et al. (2014) indicated that there was no relationship between music aptitude and phonological awareness in Spanish, it may have to do with the way in which children were assessed. Rather than using a previously constructed test to assess musical discrimination (one way of referring to music aptitude), Abello et al. chose to use a researcher-created, tablet-based game with relatively low reliability ( $\alpha = .70$ ). This reliability measure does not indicate strong reliability; however, for some researchers it is acceptable. Additionally, to assess phonological awareness in Spanish, Abello et al. used the ABCDeti reading comprehension test (Rosas et al., 2011), which disaggregates phonological awareness into three separate tasks: syllable segmentation, recognition of syllables, and final/initial sound recognition. Looking at each of these tasks may not yield statistically significant results because none of them are looking at the phenomenon of phonological awareness but rather individual components of phonological awareness. The present study did use a phonological awareness in Spanish measure that combined the scores to calculate an overall phonological awareness ability (Riccio et al., 2004). With this combined score, a statistically significant, medium-sized positive relationship was detected.

### **Phonological Awareness and Morphological Awareness**

Previous studies indicated that there is a relationship between phonological awareness and morphological awareness in English (Carlisle, 2000; Carlisle & Nomanbhoy, 1993; Deacon & Kirby, 2004; Kirby et al., 2012) and Spanish (Kieffer & Lesaux, 2008). The present study provides evidence in support of the relationship between phonological awareness in English and morphological awareness in English; however, due to an invalid, unreliable measurement tool for morphological awareness in Spanish, no evidence of this relationship is present.

## ***English***

There is a statistically significant, medium-sized positive correlation between phonological awareness in English and morphological awareness in English. This supports previous research (Carlisle, 2000; Carlisle & Nomanbhoy, 1993; Deacon & Kirby, 2004; Kirby et al., 2012). The present study adds to this body of research with the additional understanding that this phenomenon can be detected in emergent bi/multilingual first grade children in a mid-sized suburban school district in Texas.

## ***Multilingual Contexts***

While it may be important to understand how emergent bi/multilingual children in first grade connect the phonology and morphology of English, it is also important to understand how they connect these language systems in their home language. The present study did not find evidence for a relationship between phonological awareness in Spanish and morphological awareness in Spanish as Kieffer and Lesaux (2008) did; however, this may be due to the use of an invalid and unreliable measurement tool, the *IECME*. While the choice to use the *IECME* was made because previous research indicated that it was valid and reliable, the more important factor was the availability of an assessment tool. Unlike the *WAT*, which was available as a supplement to Kirby et al. (2012), no tests for morphological awareness in Spanish besides the *IECME* were present in the extant literature. One possibility to remedy this would be to collaborate with other research teams that have developed valid and reliable measurement tools for the assessment of morphological awareness in Spanish. One possibility could be the morphological awareness in Spanish tests mentioned by Ramirez et al. (2009); however, the issue is that the researcher-created test was not openly available in the extant literature.

## **Cross-Linguistic Transfers**

To extend beyond the ways in which music aptitude, phonological awareness, and morphological awareness interacted in single languages, there seems to be strong evidence of a cross-linguistic transfer of phonological awareness. There may have been the presence of cross-linguistic transfer in morphological awareness; however, the invalid and unreliable results from the *IECME* may have made this undetectable.

### ***Phonological Awareness***

The only correlation that was considered substantial was that between phonological awareness in Spanish and phonological awareness in English. This correlation was a statistically significant, substantial positive relationship. The quantitative data provided strong evidence for the cross-linguistic transfer of phonological awareness for Spanish-English emergent bi/multilingual first grade children in a mid-sized suburban school district in Texas. Additionally, the qualitative data, especially from Antonio, provides evidence for how children embody this knowledge in their writing.

### ***Morphological Awareness***

While the present study did not provide evidence for a direct, statistical cross-linguistic relationship between morphological awareness in Spanish and morphological awareness in English due to the invalid and unreliable measurement tool for morphological awareness in Spanish, it does provide evidence to support a cross-linguistic transfer between phonological awareness in Spanish and morphological awareness in English as a statistically significant, medium-sized positive correlation. This aligns with previous research (Kieffer & Lesaux, 2008). Seeing that there is a substantial relationship between phonological awareness in English and morphological awareness in English and that there is a medium-sized relationship between

phonological awareness in Spanish and morphological awareness in English, future research should include a more reliable and valid measurement tool for morphological awareness in Spanish such as the *Test of Morphological Structure Spanish* and the *SD Oral+ Written Words Spanish* created by Ramirez et al. (2009).

### **Children's Voices**

While it is important to understand these phenomena as they relate to previous research, more importantly, the voices of the participants should be heard. The present study adds to the body of knowledge of how first grade Spanish-English emergent bi/multilingual children embody music aptitude, phonological awareness and morphological awareness in their speech and writing. These findings provide evidence of the importance of providing young children with active music making experiences as Carolina, the child with the highest score on the *PMMA* (the music aptitude measure), was the only child in the qualitative portion to report that she engaged in active music making outside of the classroom. Knowing how music aptitude relates to phonological awareness, it is important to foster active music making experiences both in and out of the classroom. This viewpoint is supported by the empirical findings in that active music making treatment Patscheke et al. (2016) did with young immigrant children.

Further, Antonio provided numerous examples of how Spanish orthography and phonology could be related to English orthography and phonology, which shows how a first grade Spanish-English emergent bi/multilingual student may be able to make deep connections with languages even when quantitative measures do not demonstrate knowledge of the topic (he scored below the mean on both the phonological awareness in Spanish and the phonological awareness in English tests). Extending the embodiment of phonological awareness, Carolina provided ways in which she was able to use her phonological awareness to activate her



morphological awareness. She did this in her word work with the description of a whale that had the /k/ sound, which was likely either an orca or killer whale as she described it as “el que tiene un ojo...um...que es blanco. [the one that has the eye...um...that is white].” This demonstrates how Carolina utilized her knowledge of phonological awareness to create meaning from the sounds that she associated with an unknown or forgotten word.

### **Implications for Education**

Due to the multidisciplinary nature of this study, many different fields can benefit from the findings including music education, bi/multilingual education, early literacy, and assessment. For music education these include centering minoritized populations in research and providing evidence for the importance of active music making in the first grade classroom. For bi/multilingual education these include advocating for the inclusion of music in the bilingual classroom and understanding the importance of the development of the heritage language. For early literacy, these include understanding the connection between phonological awareness and morphological awareness and how to apply that knowledge to instruction and the power of including active music making to develop phonological awareness, which may in turn develop morphological awareness. Lastly, for assessment, these include the development of short, valid, and reliable assessment tools for early literacy, especially that of morphological awareness that are openly available for research and instructional purposes.

#### **Music Education**

Music education research has a history of not including minoritized populations and often focuses on topic-based analyses, a subject’s age, or a subject’s musical background (Drave et al., 2008; Killian et al., 2013; Kratus, 1992; Nichols, 2013; Schmidt & Zdinski, 1993; Yarbrough, 1984, 2002). Ebie’s (2002) call for including special populations based on race or nationality is

welcomed. This study centers the linguistic diversity present in our schools. Lozada et al. (2022) noted that public schools have a majority minority population. This means research should be conducted that reflects the diversity in public school classrooms. The present study aims to extend how music education research should center on different demographic groups in order to best understand how music educators can best serve the diverse student population best.

Extending this line of thought, because research should center on the diversity present in the public schools, quantitative research should be conducted from a critical quantitative perspective (Stage, 2007; Stage & Wells, 2014). This would include centering the experiences of the subjects studied but also acknowledging the diversity present in sample populations. These samples should reflect the heterogeneity of public schools and not the imagined (or socially constructed) homogeneity of public schools. When we begin to fully understand phenomena from multiple perspectives, educators can be better equipped to work with a diverse student population.

### **Bi/Multilingual Education**

These data demonstrated how a connection with active music making can relate to higher rates of phonological awareness in Spanish for this population. With this, it is important to advocate for the inclusion of active music making experiences in the music classroom. Lozada et al. (2022) and Ríos-Jiménez et al. (2020) offered ways to include active music making to develop bi/multilingual literacy skills. These are especially important as they form a cultural anchor to the heritage language.

Creating opportunities for literacy to interact with culture through music can help students develop their music aptitude, phonological awareness, and morphological awareness throughout their linguistic repertoire. Applying culture in this way can be seen as a culturally

sustaining pedagogy in which a student's languages, literacies, and cultures are centered on instruction in order to foster greater literacy development (Paris & Alim, 2017).

### **Early Literacy Indicators**

When students' languages, literacies, and cultures are valued, literacy can truly be developed. These data indicated a strong connection between phonological awareness in Spanish and English as well as a correlation between phonological awareness and morphological awareness in English. Given this, it is important to leverage this in instruction. These data support researchers who found that morphological awareness can affect literacy in early elementary-aged students (Berninger et al., 2010; Carlisle & Nomanbhoy, 1993) and support the evidence from Casalis and Colé (2009) that demonstrated the importance of phonological awareness in literacy development for young children. Knowing that these phenomena are documented in a cross-linguistic fashion with Spanish-English emergent bi/multilingual students in Texas, teachers should be given instructional tools to leverage a students' home language to develop both phonological awareness and morphological awareness.

Such instructional strategies could include musical training. Patscheke et al. (2016, 2019) demonstrated this in German-speaking immigrant and native children. Noting that there are strong positive correlations between phonological awareness in Spanish and phonological awareness in English as well as a medium-sized correlation between music aptitude and phonological awareness in Spanish, understanding how musical training can affect phonological awareness in Spanish-English emergent bi/multilingual students may be warranted.

### **Assessment**

While many choices were available for assessing music aptitude, phonological awareness in Spanish, and phonological awareness in English, and morphological awareness in English,

there were gaps in tests for morphological awareness in Spanish. With that, the *IECME* was selected because it was the only test of morphological awareness in Spanish that had both validity and reliability available. Even though the test demonstrated validity and reliability, that was not the case for this population. Many students tired quickly from this test and stopped before they could complete even half of the test. These children did not understand the concept of gendered nouns in Spanish. Many wanted to stop testing after the first two questions about which words were feminine or masculine; however, the subsequent question about plural words, a cross-linguistic phenomenon between Spanish and English, gave them the willingness to continue. Many of these concepts presented in the *IECME* were grammatical such as the gendering of nouns or verb conjugations, which were not directly taught during their Spanish literacy classes as anecdotally understood from classroom conversations with the teachers. Yet, grammatical concepts in English were often taught as a part of English language instruction.

It should also be noted that González Sánchez and García Sánchez (2007a) created a instructional program for morphology that aligns with the *IECME* (González Sánchez & García Sánchez, 2007c), which may explain why the test had such high reliability scores. The reason for high reliability scores may be because the way that the test was constructed was a threat to the internal validity of their study of reliability of the *IECME* (González Sánchez & García Sánchez, 2007b).

One way to remedy these issues for future research is to utilize a measurement tool that takes away grammatical issues and instead focuses on morphological issues such as derivational and phonological affixes. Kirby et al.'s (2012) *WAT* can serve as a model for what a morphological awareness in Spanish test might look like. Additionally, Ramirez et al. (2009) mentioned *Test of Morphological Structure Spanish* and the *SD Oral+ Written Words Spanish*;

however, these tests were not available for purchase or through supplemental online materials as the *WAT* was.

Not having a valid and reliable test for morphological awareness in Spanish created results that may not truly represent all phenomena accurately. With that, researchers should share and publish valid and reliable measurement tools, especially in regard to morphological awareness in Spanish, to create more opportunities for valid studies. Beyond the application of measurement tools for research purposes, these tests should also be quick and easy for teachers to use in their work. Kirby et al.'s (2012) *WAT* is a great example of a quick test that gives valid and reliable results about how a student understands the morphology of English and can guide instruction to pointing out certain ways of understanding morphology in English. I suggest that the present study be replicated with either a test for morphological awareness in Spanish like those presented by Ramirez et al. (2009) or with a version of the *WAT* that corresponds to morphological awareness in Spanish.

### **Recommendations**

Given the aforementioned implications for education, the following recommendations provide opportunities for policymakers, practitioners, and researchers to create educational experiences for children that will better their literate lives. For policymakers, this evidence points to a greater importance for early childhood literacy development, early childhood bi/multilingual education, and early childhood music education. For educators, this evidence draws conclusions that support bi/multilingual education in early childhood, using the arts as a means to support language and literacy development, and using assessments that are quick, valid, and reliable. For researchers, there is a need for more test development, especially for quick, valid, and reliable measurement tools that can benefit both researchers and practitioners and for a need to continue

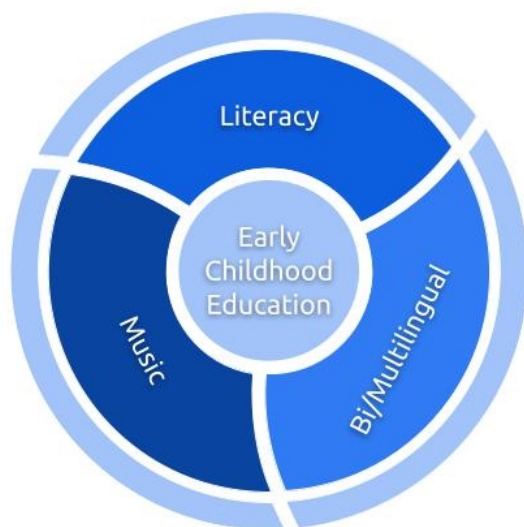
to grow the understanding of how music aptitude, phonological awareness, and morphological awareness are related, especially in understudied populations like Spanish-English emergent bi/multilingual children.

### **For Policy**

The Foundations for Evidence-Based Policymaking Act of 2018 calls for policymakers to demand research that is quantitatively sound in order to inform policy. The present study provides evidence for policymakers with a correlational design for increasing funding for early childhood literacy development, early childhood bi/multilingual education, and early childhood music education (see Figure 5.1). These quantitative data are corroborated by the qualitative data and explained through the mixed methods analysis.

**Figure 5.1**

*Implications for Early Childhood Education Policy*



Early childhood is a powerful time for literacy learning (Berninger et al., 2010; Carlisle & Nomanbhoy, 1993; Lyster, 2002). Advocating for an increase in funding for early childhood education might alleviate problems associated with older students in the public education system. This is especially true for literacy education. The present study documented a moderate, positive relationship between phonological awareness in English and morphological awareness in English. These data corroborate Carlisle's (2003, 2010) findings that this relationship is especially important for literacy education. While understanding that early childhood literacy education can impact all students, it is even more important for policymakers to understand how the present study contains evidence for this relationship for emergent bi/multilingual children.

Emergent bi/multilingual children reflect what Wei (2007) found as the experiences of about one-third of the world's population. This experience should be central to the experiences of all American children because being bilingual creates opportunities for all children. This study presents evidence that there is a strong, positive relationship between phonological awareness in Spanish and phonological awareness in English. Additionally, there is a moderate, positive relationship between phonological awareness in Spanish and morphological awareness in English. While these relationships do not indicate a causal effect, the connection of bilingualism enhancing language development cannot be dismissed. These data suggest the presence of a cross-linguistic relationship between Spanish and English. Knowing this, instruction in both languages may positively affect language and literacy learning in early childhood education. Thus, providing children with early childhood bi/multilingual education could offer benefits for language and literacy development. Beyond this, when bi/multilingual education connects with the arts, children can develop academic excellence, biliteracy, cultural competence, and critical consciousness to the fullest (Barton, 2014; Berriz et al., 2019; Chappell & Faltis, 2013).

Arts education, specifically music education, should have a place in the education of all children. The findings in this study indicate that there is a moderate, positive relationship between music aptitude and phonological awareness in Spanish. These data suggest that leveraging the developmental nature of music aptitude in early childhood could lead to positive outcomes in regard to phonological awareness and even literacy instruction overall. Policymakers should ensure that all children in early childhood public education receive a music education. While there are no quantitative data to support what type of music education should be taught, the qualitative data suggest that a music education based on active music making. Carolina reported numerous experiences with active music making and scored the highest on the music aptitude measure, the *PMMA*. She also scored well above the mean on the phonological awareness measures, the *TPAS* and the *PAT-2*. These qualitative data should serve as a starting point for advocating for active music making in music education. The Alliance for Active Music Making (n.d.) could serve as a starting point for policymakers to create opportunities for teacher education that supports this kind of education. Teachers are the key to enacting these policies into practice.

### **For Practice**

Applying policy to practice can be challenging; however, educators work hard to realize policy in their classrooms every day. These recommendations for educational practices relate to the recommendations for policymakers and include support for bi/multilingual education in early childhood, using the arts to support language and literacy development, and using assessments that are quick, valid, and reliable.

Teachers should leverage bi/multilingual practices within their classroom to foster language and literacy education. This study provides evidence for how bilingualism, specifically



in the context of Spanish-English first grade children, can be leveraged to build language and literacy skills. Cross-linguistic transfer between Spanish and English regarding phonological awareness provides an argument for teaching first grade children in multiple languages. Making these skills explicit can create opportunities for children to grow their knowledge about language and thus their knowledge in general. Because phonological awareness is related to music aptitude, especially in Spanish as evidenced in this study, leveraging this connection can also impact language and literacy education for bi/multilingual children.

The arts are a powerful tool in creating deep learning experiences, especially within bilingual education (Barton, 2014; Berriz et al., 2019; Chappell & Faltis, 2013). More specifically, music has a unique place in bilingual education (Skerrett, 2018). This study provides evidence through the documented relationships between music aptitude and phonological awareness in Spanish that the development of music aptitude might correlate with growth in phonological awareness in Spanish. This relationship creates opportunities for educators to leverage music in their literacy classrooms. Some ways to include music in the literacy classroom are to value the heritage language and culture of students (Lozada et al., 2022) or directly relate literacy skills to music skills (Ríos-Jiménez et al., 2020). Beyond music, the qualitative data indicated that children use visual arts to portray meaning and develop writing skills. Both Carolina and Antonio leveraged visual arts to express their ideas in their writing. Teachers should ensure that education and more specifically the education of bi/multilingual children includes arts education.

Adding to how the qualitative findings can impact educational practice, the ways in which the children have interacted with the testing materials supports teachers using quick, valid, and reliable assessments to understand the ways to lead students to additional knowledge. There

were no statistically significant results relating to morphological awareness in Spanish. This is likely because the test used was invalid for this population. E. Berndt (personal communication, February 3, 2022) indicated that she desired a good instrument for Spanish morphology.

Something educators can take from my experiences with this particular test is that the assessment tools they use should be (1) quick because young children, especially in first grade, can often become frustrated with a test and stop if it takes too long, (2) reliable because some tests do not accurately measure the same way from child to child, and (3) valid because many tests like the *IECME* might be valid for one group of people but invalid for others. These types of issues with testing could be remedied by how researchers develop testing materials for educators.

### **For Future Research**

Researchers play a unique role in the educational process by bridging policy and practice. Policymakers desire researchers to provide evidence that can inform their decision making while practitioners desire researchers to provide evidence that can directly help students achieve their goals. With that, these recommendations aim to bridge policy and practice and are the need for more test development, especially for quick, valid, and reliable measurement tools that can benefit both researchers and practitioners and for the need to continue to grow the understanding of how music aptitude, phonological awareness, and morphological awareness are related, especially in understudied populations like Spanish-English emergent bi/multilingual children.

Practitioners need quick, valid, and reliable assessment tools to be able to work with children. Policymakers desire research grounded in evidence-based practices, especially those related to quantitative data (Foundations for Evidence-Based Policymaking Act, 2019).

Researchers can play the role of bridging these two desires by creating testing materials that are quick, valid, and reliable. There is especially a need for researchers to develop testing materials

for morphological awareness in Spanish. While some research such as that conducted by Ramírez et al. (2009) alluded to quick, valid, and reliable assessment tools, they are not openly available. These types of assessments should be shared with not only other researchers but also with teachers so that they can use these assessments to better understand their students.

Beyond the need for quick, valid, and reliable assessments, researchers should also work to center marginalized populations in their research such as Spanish-English emergent bi/multilingual children. The present study adds to the body of knowledge about the relationships among music aptitude, phonological awareness, and morphological awareness both quantitatively and qualitatively; however, there remain questions about how morphological awareness in Spanish may interact with these variables. Because this study does not align with previous research with Spanish-English emergent bi/multilingual children such as Abello et al.'s (2014) work, there seems to be an additional need to understand how knowing a second language impacts these relationships.

Had the present study not centered on the experiences on this particular marginalized population, these implications and recommendations could not have been substantiated. When researchers apply a critical lens to their research, they are able to center the experiences of marginalized populations. Normally, this would mean hearing the experiences of marginalized populations through qualitative research; however, doing only this kind of research may exclude these voices from policymaking because of the value placed on more quantitative, positivist epistemologies present in policymaking. With this, researchers should aim to include both quantitative and qualitative methods in their critical inquiry. Critical quantitative research as described by Stage and Wells (2014) can provide a starting point for researchers in how to center marginalized populations in their research in order to impact policy making to their benefit.

Being the bridge between policy and practice, it is the duty to bring research that both values the experiences of marginalized populations and understands how to bridge this knowledge with the positivist epistemology that is pervasive in policy making.

I recommend to researchers that they work to bridge policy and practice by conducting research from a critical quantitative perspective and even perhaps a critical mixed methods perspective that gives credence to the experiences of marginalized populations while meeting policy making standards to enact positive change in their lives. For music education research, that would mean moving away from the more traditional topic-based investigations to embracing how marginalized populations can be centered in music education research such as the work done in regard to gender (Trollinger, 2021) or sexual orientation (Bergonzi, 2009). However, conducting critical quantitative or critical mixed methods research that centers on other populations such as Spanish-English emergent bi/multilingual populations can serve as a bridge between the experiences of marginalized populations and changes to policy.

For literacy research, that might mean adjusting methodological questions of centering marginalized populations in qualitative research in order to hear their voice to bridging the voices of marginalized populations with quantitative data that can inform policy makers who might have a more positivist epistemology. Documenting one's point of view through qualitative research alone might provide evidence for the experiences of marginalized populations, yet our government is concerned with evidence-based, statistically measured data (Foundations of Evidence-Based Policymaking Act, 2019). Conducting research that bridges these two competing epistemologies in order to make a positive change for marginalized populations could be accomplished by taking a critical mixed methodological approach both valuing the voices of

marginalized populations while conducting research that can positively impact the same marginalized population.

### **Limitations**

While the present study adds to the body of knowledge pertaining to music aptitude, phonological awareness, and morphological awareness some limitations impacted these conclusions. First, the sample size of this study was small and limited. The choice to include only a small sample was done for both feasibility and because documented effect sizes seemed to suggest that only a small sample would be needed. For feasibility, the COVID-19 global pandemic may have impacted how many children chose to participate. For some, consent forms are difficult to understand even when written in a person's native language (as was the case in the present study). These consent forms included risks associated with research that have been documented pre-pandemic and the risks associated with exposure to the COVID-19 virus. These additional risks may have impacted the choice of some to participate or not.

While the documented effect sizes indicated through an a priori power analysis that a small sample size was suitable, it may benefit future studies to expand the number of participants to investigate any relationships among music aptitude, phonological awareness, and morphological awareness in emergent bi/multilingual children in case these observed effect sizes could show a relationship among music aptitude, phonological awareness, and morphological awareness.

These small effect sizes may be attributed to the *IECME*, which these data suggest is not valid or reliable at detecting morphological awareness in Spanish for Spanish-English emergent bi/multilingual first graders from Texas. The lack of available measurement tools for morphological awareness in Spanish created difficulties in understanding how morphological

awareness in Spanish may relate to the other studied variables. Future research should work to create and validate a quick, valid, and reliable assessment for morphological awareness in Spanish for the purpose of research with this population.

### **Conclusions**

Music aptitude, phonological awareness, and morphological awareness are all interrelated. Teachers of young children, especially those in first grade should work to ensure that all of these are developed. This is especially true for emergent bi/multilingual first grade children because they not only develop these skills in their native language but also develop a cross-linguistic awareness of how they interact. The children in this study demonstrated that they have this cross-linguistic understanding both quantitatively and qualitatively.

It is important for music educators to become literacy educators and for literacy educators to become music educators in order to foster the whole child's development (Hansen et al., 2014). This is especially true for bi/multilingual children because of the many ways in which languages, literacies, and cultures interact within their bi/multilingual lives. Children should be given opportunities to develop their music aptitude through active music making experience, their phonological awareness through speech and writing, and their morphological awareness through speech and writing in order to lead fulfilling bi/multilingual and musical lives. When children are given opportunities to develop their music aptitude, their phonological awareness may be impacted. When children are given opportunities to develop their phonological awareness, their morphological awareness may be impacted. When music aptitude, phonological awareness, and morphological awareness are developed simultaneously, children can reach new heights in their language and literacy development, which can lead them to a better future.

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