
RAISING READING STANDARDS THROUGH TARGETED MUSIC TUITION



Carinya

CHRISTIAN SCHOOL
From Christ and For Him



empowering
independent
education

RAISING READING STANDARDS THROUGH TARGETED MUSIC TUITION

SCHOOL

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Executive Summary

**“TO LEARN TO READ IS TO LIGHT
A FIRE; EVERY SYLLABLE THAT IS
SPELLED OUT IS A SPARK.”**

- Victor Hugo

Reading is a fundamental life skill which is a primary focus of learning in schools. It provides the tool to find meaning from texts and open up a world of knowledge and enjoyment for children. It is apparent that despite traditional methods of intervention, if reading skills have not developed by Year 3 it is likely that children will fall further behind and in some cases will be unable to grasp the skills necessary to read independently.

At Carinya Christian School a significant cohort of students in Middle School (Years 5-8) were classified as low ability readers. In spite of the use of traditional reading intervention programs, such as MiniLit and Reading Recovery, there was very little progress in their reading ability. This led to an opportunity to examine the impact of instrumental music tuition as a form of reading intervention in addition to the interventions already being used with these students.

How students “hear the world” has a significant impact upon their early progress as readers.

How students “hear the world” has a significant impact upon their early progress as readers. Furthermore, there is a growing body of research demonstrating a relationship between music tuition and improved auditory processing, phonological processing, neuroplasticity and executive function. All of these areas have an interaction in developing pre-reading skills. Enhancing these skills through music tuition may benefit students who have consistently shown a lack of progress in reading.

A longitudinal cohort study was used to assess improvements in reading. The cohort of students involved in the music intervention has been compared to a group of similar students who are not involved in the intervention. Students’ reading progress was assessed using standardised tests of reading comprehension.

The intervention was designed so that students would learn a musical instrument over an eighteen month period. They could choose from

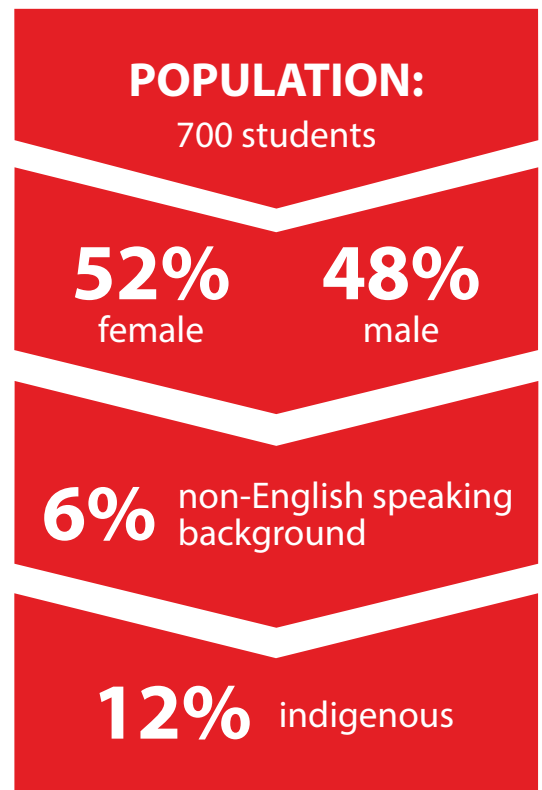
flute, clarinet, saxophone, trumpet, and baritone horn. Students participated in one small group (2-3 students) tuition and one ensemble lesson each week. The Control Group did not participate in music tuition. Students were interviewed to examine broader impacts of music tuition on the student including motivation, self-efficacy, confidence and engagement.

Results show that music tuition had a positive impact on the reading experience of low ability readers. Statistical analysis of the PAT reading comprehension results demonstrates a very large effect size of $d = 1.22$, whilst an analysis of PROBE 2 Reading Comprehension Assessment reveals an effect side of $d = .67$. There have also been other impacts from the project including improvements in their sense of achievement, engagement in class and the development of social relationships. All students have been able to learn a variety of pieces of music, with some students even reaching a standard where they could be graded for their achievement. Students performed in ensemble groups at several school functions, enjoying the experience.

Introduction

BACKGROUND

Carina Christian School is an independent, Christian, Pre-Kindergarten to Year 12 comprehensive school located in Tamworth, North West NSW. It has a student population of approximately 700 students with an ISCEA score of: 1027 (this is based on 2018 My School data). The student population is approximately 52% female and 48% male, with 6% of students having a language background other than English and 12% indigenous students. All year groups in the primary school are double streamed, whilst Years 7-10 are triple streamed. Over 60% of parents within the school community have completed Year 12 or equivalent in their own school education. More than 20% of parents work in senior management or are qualified professionals, over 20% were other business professionals or in middle management and over 20% work in skilled trades. Overall the school population is an average population, and the students would not be considered to be 'disadvantaged'.



The school has two campuses, Tamworth and Gunnedah. Tamworth uses a three-school structure (Junior, Middle and Senior). Up until 2019 Gunnedah enrolled students from K-6 only. In 2019 the first year 7 students enrolled at Gunnedah in a move towards a similar structure to the Tamworth campus. The school is known for its distinctive approach to Christian Education. All staff are practising Christians, and the value of every child drives the classroom teaching at every stage of the school. This framework encourages students to be motivated by the act of learning rather than by other extrinsic motivators. Consequently, there are no competitive structures used in the classroom, rivalry between students is discouraged, and there are no awards given for learning at any stage of the schooling.

In Carinya's own words:

Because we reject rivalry and competition in the classroom, students are encouraged to "seek the reward in the task". That means students are to look for any "reward" in faithfully completing all tasks to the best of their abilities. In other words, the "reward" for learning mathematics is that they now know more mathematics. The "reward" for learning to read is that they can read. In educational terms students are taught to seek "intrinsic" rather than "extrinsic" rewards.

(Carinya Christian School, 2019)



Collaboration between the Junior, Middle and Senior schools enables a significant number of teachers to work across two schools, and some to teach across all three. As a result, teachers tend to have a strong relationship with students, and continuity of learning is a particular strength of the school.

It needs to be noted that the school uses “Teaching Handwriting, Reading and Spelling Skills” (THRASS), as the predominant method of literacy instruction in K-6. This method has a focus on teaching through phonetics.

“It is a system for teaching learners of any age about the building blocks of reading and spelling, that is, the 44 phonemes (speech sounds) of spoken English and the graphemes (spelling choices) of written English. THRASS has a unique methodology known as the THRASS Specific Pedagogical Practice (TSPP). THRASS is divided into three main skill areas – reading, spelling and handwriting. These skills are interrelated and build on each other to increase a learner’s knowledge and understanding of the relationship between the 44 phonemes and the 26 letters of the alphabet (The Alphabetic Principle – the key to successful reading and literacy)” (THRASS Institute, 2019).

Music at Carinya is taught using an ‘Orff-Schulwerk’ perspective. The Orff teaching process involves singing; body percussion; playing on a variety of both tuned and untuned instruments; movement and dancing; as well as speech activities to encourage active music making (ANCOS, 2019). Orff has an improvisational focus and the philosophy gives a range of entry points to students of different skill levels and abilities. Music is taught in the secondary school

by specialist music teachers, whilst in the primary school it forms part of the Creative Arts syllabus and is taught by the generalist K-6 teacher.

A group of low achieving students was identified, particularly in the learning area of reading. Areas of reading have consistently trended above state average, however there are a number of students well below stage outcomes. In 2017, in Years 5-8 there were a number of students achieving bands 1 and 2 in NAPLAN, in reading. In response to the current focus on NAPLAN achievement and minimum HSC standards in literacy, this study looks at alternative methods of supplementing reading instruction with struggling readers. The findings will be extremely useful, not only to teachers at Carinya Christian School, but to the wider teaching community. The Project Leader is trained in Music Education and has an ongoing interest in the research area. It was therefore decided that it would be timely to implement the research project at this stage. The research team, assisted by music education researcher Dr Anita Collins, applied to the AIS for project funding in August 2017, and was successful in attaining a grant of \$96,000 over two years for the administration of the project.

RATIONALE

The timeliness of the project is two-fold: there is currently a groundswell within the music education community where music advocacy, long consigned to the margins, is gaining increasing traction. The idea that to educate the whole child one must include the Arts (Ewing, 2019) is gaining credibility as both parents and educators ‘push back’ against a high stakes test culture. There is literature suggesting that music can remediate learning deficits in reading (Dumont, Syurina, Feron, & van Hooren, 2017), and increasing evidence of schools successfully using music as an intervention. The most widely known example of this being Feversham Primary Academy’s Music Program (Music Trust 2018). Thus this study of the potential impact music instruction can have upon the reading ability of students with a learning difficulty, is both timely and appropriate.

PROJECT AIM:

To study the effect of using Music Tuition as an intervention to counter low achievement in literacy, in a group of identified, Middle School students whose reading age is significantly below stage outcomes at Carinya Christian School.

The project aimed to study the effect of using Music Tuition as an intervention to counter low achievement in literacy, in a group of identified Middle School students whose reading age is significantly below stage outcomes at Carinya Christian School.

The project is a study in measuring the impact of musical tuition on low ability readers. There

has been significant research on the connection between musical tuition and cognitive ability, specifically IQ testing and enhanced reading ability. However, there are few studies that specifically address the interaction between reading ability and music tuition. Furthermore, when the literature was examined more thoroughly it became evident that studies looking at music tuition helping students with reading difficulties, generally only examined students with the specific learning disorder (SLD) of dyslexia (Antonietti, Bonacina, Cancer & Lorusso, 2015; Goswami, 2011; Habib, Lardy, Desiles, Comeiras, Chobert, & Besson, 2016; Overy, 2003). The researchers for this project were keen to explore the impact of music tuition upon the “garden variety poor reader” (Stanovich, 1988, p. 161). Existing research also largely focuses upon younger children. The researchers were keen to explore whether a music tuition intervention could be effective with older students. The needs of these students are particular. Beyond Year 4 the focus of classroom instruction is not learning to read, but reading to learn. Consequently, these students in the middle school age group are significantly at risk of having their SLD affect all of their schooling.

This project may be a starting point for further studies with similar students. It may also be instructive for other AIS schools, and the wider communities of teachers of literacy and music educators. The importance of this research project is twofold. Firstly, it provides an alternative model of interventions for students who struggle with reading achievement. Secondly, it provides further validation for Creative Arts subjects in the holistic education of children.

At no point are the researchers suggesting that by merely adding direct instrumental music

and comprehension are regarded as the essential skills for successful reading (National Reading, 2000), and these rely upon strong explicit classroom instruction to develop students' reading ability. The literature identifies that music tuition taps at least two of these areas, providing significant justification to proceed with this study.

Whilst much of the research in the area of music and literacy concerns the neurology of music and its impact on how the brain processes sound, it was beyond the scope of this project to take this approach. Further, the area of literacy is very broad; thus it was decided to focus upon reading comprehension, which gave a specific and narrow focus to the study. Students were not assessed for their writing abilities, lexical knowledge or spelling, which reflected the focus of the research upon reading for comprehension. It was decided to use a longitudinal cohort design with a focus upon comparing the progress of the students receiving the music intervention and those students not receiving an intervention.

For the purposes of this report, the two cohorts are referred to as the Music Group and the Control Group. The discussion will begin with positioning the work within the literature concerning reading acquisition and the influence that music can have upon pre-reading skills. Both the results of quantitative and qualitative analysis will be presented and discussed. The study's conclusions and further recommendations will be offered.



Literature Review

INTRODUCTION

A student who has a learning difficulty associated with reading faces significant challenges in the classroom. Up until the end of Stage 2 (Kindergarten to Year 4 in an Australian context) they are learning to read. Beyond this the focus shifts to reading to learn, and students face a situation where an inability to read can have a global impact on their learning (Stanovich, 1986). It could be argued that learning to read is one of the most important foundational skills a student acquires in early schooling (Foorman, Francis, Fletcher, Schatschneider, & Mehta, 1998). This issue has been further highlighted in the New South Wales context with the recent decision to make the awarding of the Higher School Certificate contingent upon meeting minimum standards in reading (Overton, O’Keefe, Jihad, Fu, & Piccoli, 2016) as well as the high stakes testing environment created by NAPLAN (J. Rose, Low-Choy, Singh, & Vasco, 2018).

It could be argued that learning to read is one of the most important foundational skills a student acquires in early schooling.

(Foorman, Francis, Fletcher, Schatschneider, & Mehta, 1998)

Some schools have responded to this by reducing teaching time for subjects such as Music to the bare minimum and increasing time for literacy instruction (De Vries, 2018; G. Graham et al., 2002). This current approach is challenged by the body of research regarding reading acquisition and the role that a holistic education can play in this process (Ewing, 2019). In particular, there is a significant amount of research emerging that suggests that well considered music tuition can be beneficial for those students who struggle to learn to read (Overy, 2003; Register, Darrow, Swedberg, & Standley, 2007). The literature suggests that music training functions in a similar area of the brain as language processing and thus can support reading acquisition. Further it is suggested that music tuition can enhance several pre-reading skills such as language processing, auditory processing, and phonological understanding. The areas of neuroplasticity and executive function are also strengthened through music training. These areas all tap reading skills. Thus it is of paramount importance to establish exactly what is known regarding the use of music as a remediating tool for reading acquisition (Dumont, Syurina, Feron, & van Hooren, 2017).

This literature review focuses upon understanding the process of reading acquisition in school aged children. Further, it examines how music instruction can supplement the learning process

for children with learning difficulties associated with reading. Both the ‘simple view of reading’, and the more neurological aspects of the reading process will be explained. From this basis, links will be made with the current research suggesting that music tuition can enhance necessary pre-reading skills.

DEFINING LEARNING DIFFICULTIES IN READING

When looking at the student who struggles to read, it must be acknowledged that there are a number of factors at play. There is even complexity surrounding how such a student should be described; in the Australian context various terms are used interchangeably. Whilst globally the term “learning disability” is used, the term “learning difficulties” is more readily used in Australia. The definition used throughout this document is given by Learning Difficulties Australia (LDA), which in turn is informed by Graham and Bailey (2007). In this definition, a learning difficulty refers to students who “experience significant difficulties in learning and making progress in school, but do not have a documented learning disability.” 80% of students with a learning difficulty experience difficulties with reading. Within this larger group some students may experience longer and more severe learning difficulties, and they are sometimes described as having a learning disability. Interestingly, in Australia the term “learning disability” has no precise definition (Learning Difficulties Australia, 2019).

Even so, when it comes to the domain of reading, particular learning disabilities are given a label, the most obvious and relevant to this discussion being ‘dyslexia’. Again, the definition of dyslexia is variable, across different learning institutions. LDA states:

“Dyslexia is a term used to describe a difficulty with reading words that is persistent, not responsive to remedial intervention, and cannot be attributed to other factors such as poor oral language skills, inadequate instruction, or low ability level. It is therefore assumed to be due to underlying neurological or genetic factors, primarily affecting the phonological processing skills that are required for reading words” (Learning Difficulties Australia, 2019).

The more widely accepted and more “technical” definition of dyslexia is that which has been adopted by both the International Dyslexia Association (IDA) and the National Institute of Child Health and Human Development (NICHD):

“Dyslexia is a specific learning disability that is neurological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede the growth of vocabulary and background knowledge” (Fletcher, Lyon, Fuchs, & Barnes, 2018, p. 110).

Put more simply, a dyslexic is a child who has difficulty reading. The important factor is that they are of normal intelligence, yet breaking the reading code seems to have eluded them. This discussion will be focused upon this type of learner: a child whose profile as a reader is anomalous with their presentation in the classroom, aside from their learning difficulty or disability. At no point

are we suggesting that a music intervention can help students with significant global learning disabilities.

THE PROCESS OF READING ACQUISITION

There is general agreement amongst the educational research community as to the five abilities necessary for successful reading: phonemic awareness, phonics, fluency, vocabulary and comprehension (National Reading, 2000). Further, fluency, a key component of reading success, is seen as the ability to read text quickly, accurately and with appropriate expression (Goering & Baker, 2010; Kuhn & Stahl, 2003; Meisinger, Bloom, & Hynd, 2010). The “*simple view of reading*” (Hoover & Gough, 1990; Hoover & Tunmer, 2018; Torppa, Tolvanen, & Eklund, 2007) defines reading ability as a function of decoding and comprehension skills; or, put another way, the process of recognising words and understanding words or understanding language, and reading symbols (Buckingham, Wheldall, & Beaman-Wheldall, 2013).

Phonemic awareness is a specific aspect of the broader skill of phonological awareness. It is usually the last of this skill set to develop. It involves a student being able to hear, manipulate, segment and blend sounds in words. Segmenting is breaking a word down into its separate parts: C-A-T. Blending is then blending these sounds into the word CAT. Manipulating sounds would involve changing CAT to BAT. Phonological awareness is a listening skill, and deals with larger units of language, such as the number of syllables in a word, or rhyming words. Children with well-developed phonological skills will be able to demonstrate skills such as tapping out the number of syllables in a word or sentence: ex-cit-ed, or find words that rhyme or have the same onset rhyme.

Finally, phonics is the point at which students learn letter-sound correspondences. It is acknowledged that students need strong phonological awareness as an overall broad pre-reading skill. From this base, students develop phonemic awareness and then phonics. These areas are interrelated and all work together to support reading acquisition (Ashmore, Farrier, Paulson, & Chu, 2003; Blachman, 2013; Brady, 2013; Carlisle, Thomas, & McCathren, 2016).

Conversely, reading disability, or *'learning difficulties associated with reading'* is seen as difficulties with word decoding, slow dysfluent and inaccurate reading. There is general agreement amongst the literature that acquisition of reading skills is a focus of the early years of schooling; somewhere around early primary the focus shifts from *'learning to read'*, to *'reading to learn'* (Lane & Mercer, 1999; Stanovich, 1986). Thus students who fall behind in their reading skills as they transition into middle school years are also entering an environment where the curriculum is focused on content rather than the skill of reading acquisition (Solis, Miciak, Vaughn, & Fletcher, 2014; Wendt, 2013), making them vulnerable to an even greater lag in their reading ability. As Rose (2011) so eloquently states, the middle school student is entering a world where the skills of reading and writing are no longer the focus of classroom teaching, yet the reading and writing skills required to learn the curriculum "become more elaborate. While some students' skills develop in tandem with the demands of the curriculum, many others are left further behind" (Rose, 2011, p. 87). This widening gap is of course consistent with Stanovich's application of Matthew Effects in reading (1986).

There is significant literature that supports the

idea that remediating the reading of a student after Year 3, and certainly into high school is an "uphill battle". Indeed, the effect sizes seen in the early years of schooling do not seem to be replicated in the adolescent and preadolescent years (Edmonds et al., 2009; Oslund, Clemens, Simmons, & Simmons, 2018; Scammacca, Roberts, Vaughn, & Stuebing, 2015). The most successful studies in reading comprehension seem to be ones which address the idea of phonological skills, word recognition and general development of vocabulary (Wanzek & Roberts, 2012). Interestingly, it is argued by some that this type of remediation will need to be continued throughout schooling (Wanzek & Roberts, 2012; Wanzek et al., 2013), which raises the question of whether true remediation has occurred.



THE DEVELOPMENT OF READING DIFFICULTIES

Amongst the research, the processes underlying the development of reading difficulties can be divided into cognitive and neurological factors. The cognitive aspects of reading development deal with aspects such as reading fluency, the development of a lexicon, decoding of words, phonological understanding and finally reading comprehension (Goering & Baker, 2010; Meisinger et al., 2010; Oslund et al., 2018; K. E. Stanovich, 1986). Then amongst this research there is further study that attempts to ascribe causal relationships to reading failure. Stanovich's seminal work, whilst acknowledging the complexity of interactions, summarises it thus:

“If there is a specific cause of reading disability at all, it resides in the area of phonological awareness. Slow development in this area delays early code breaking progress and initiates the cascade of interacting achievement failures and motivational problems” (Stanovich, 1986, p. 393).

Anthony and Francis state that “there is consensus that phonological awareness refers to one's ability to recognize, discriminate, and manipulate the sounds in one's language, regardless of the size of the word unit that is the focus” (Anthony & Francis, 2016, p. 256). It is acknowledged in the literature that making the connection between “sound” and “symbol” which begins at school, as children learn phonemes, is a crucial step in the reading process. Perfetti, Beck, Bell, and Hughes

(1987) describe the reciprocal relationship of literary instruction and learning to read, in that students come to school with an understanding of the sound of language, yet by learning to read and write, their phonological awareness is enhanced, which in turn helps them to learn to read. This feedback cycle is crucial in the early years of schooling as students try to break the “alphabet code”. Traditional strategies for addressing phonological awareness for struggling readers vary, however all involve some system of phonics. Smith, Walker, and Yellin (2004) highlight the need for phonics combined with a program that allows students to construct meaning, whilst Bhat, Griffin, and Sindelar (2003) argue for phonics plus word identification. Buckingham, Wheldall and Beaman-Wheldall (2014) make the salient point that phonics instruction alone is not enough; reading success is dependent on the type of system, synthetic, systemic, balanced or analogy, and the teacher's role in instruction.

Reading fluency (RF) occupies an important place in assessing the success of student's reading efforts as it gives a clear indication of how automatically the student is able to read. The role of fluency does not discount the simple view of reading, however it does explain some of the processes behind it. It is recognised for instance, that for reading to become automatic and seamless, many things need to happen at once, (decoding, metacognition and comprehension) before a reader can be called fluent (Goering & Baker, 2010; Kuhn & Stahl, 2003;

National Reading, 2000; Rasinski & Padak, 2005). Students who are moving into higher primary school grades or even high school who are still struggling with RF are afforded less classroom time to address this deficit as on the whole RF is seen as an early reading skill (Rasinski & Padak, 2005; Stahl & Yaden, 2004). Unsurprisingly, there is a high correlation between low levels of RF and low levels of comprehension; the main hypothesis regarding this has to do with the cognitive load created by the act of reading. A child's cognitive load becomes so high from the act of reading, that they have no resources left to understand what they are reading (Cutting, Materek, Cole, Levine, & Mahone, 2009; Goering & Baker, 2010; Kim et al., 2017; Kuhn & Stahl, 2003; Meisinger et al., 2010; Rasinski & Padak, 2005; Schwanenflugel, Hamilton, Kuhn, Wisenbaker, & Stahl, 2004).

Ultimately the importance of RF as a step in the process of reading acquisition could be understood as orthographical-phonological mapping. As students become adept at recognising the representation of phonemes through symbols, and then quickly blending these phonemes into words, they transition from a laborious process to an automatic process. At this point students begin developing their vocabulary or lexicon. What some would call "sight words" is really orthographical mapping and fluency working together (Buckingham et al., 2013, 2014; Ehri, 2013; Pfost, Hattie, Dörfler, & Artelt, 2014; Ricketts, Bishop, & Nation, 2009; Rosenthal & Ehri, 2008).

Word identification is one of the strongest predictors of struggling readers (Oslund et al., 2018), however working in concert with this is vocabulary knowledge (a different system). It is known that students who begin school already

behind in their vocabulary can also experience disrupted reading progress (Lervåg, Hulme, & Melby-Lervåg, 2018; Oslund et al., 2018; Rowe, Raudenbush, & Goldin-Meadow, 2012; Wise, Sevcik, Morris, Lovett, & Wolf, 2007).

Whilst on one level the Simple View of Reading is an elegant expression of reading acquisition, it seems that when dealing with reading failure there seems to be almost a cascade of events. Reading is not a natural skill, humans have adapted to it (Stanovich & et al., 1984) and there is a certain complexity to reading failure. It would be oversimplifying things to attribute one cause and to offer one solution.

To come to a full understanding of these complexities, it is necessary to consider some of the more neurological aspects of reading failure. An understanding of this area could possibly offer some solutions to the questions of how to help these students. For example, what actually is getting in the way of a student's phonological awareness and how can we help them? Thus, for this research team, it is the processes in the brain that are of interest, as it is here that music tuition can have its impact. These areas can be broadly defined as: auditory processing, phonological processing, neuroplasticity and executive function. Some would describe this as the "top down" aspects of reading, or rather the aspects of reading driven by neurological processing. Aspects such as word recognition and decoding are described as bottom up, or driven by cognition. The complexity of reading is such that what is really occurring is an interaction of bottom up and top down skills. It can be argued, however, that music tuition really taps the 'top down' aspects of reading acquisition (Cutting et al., 2009; Lam, White-Schwoch, Zecker, Hornickel, & Kraus, 2017).

THE TOP DOWN ASPECTS OF READING ACQUISITION

AUDITORY PROCESSING

Whilst it is understood that phonological awareness and its cascade into orthography, fluency and vocabulary is the key building block of reading success (K. E. Stanovich, 1986) there is also a body of research linking the breakdown of both phonological processes and the auditory processing associated with processing language, with reading disability. Goswami's Temporal Sampling Framework (TSF) highlights the auditory processing difficulties faced by students who struggle with reading difficulties (Goswami, 2011), arguing that their difficulties with phonological awareness, phonological memory, phonological output, syllable stress, and prosodic perception can be directly attributed to the way that these students "hear the world". Further, their difficulties with filtering background noise, sluggish attention shifting, cerebellar function and difficulties with rhythmic entrainment (which affects their understanding of the syntax of language) can also be implicated in their auditory processing (Goswami, 2011).

The recent work of Bonacina, Krizman, White-Schwoch, and Kraus (2018), in looking at the TSF also reinforces the importance that auditory processing has in the acquisition of reading. The work of Neef et al. (2017) establishes firmly the link between auditory processing and reading acquisition when they write:

"It is plausible to assume that an imprecise encoding of acoustic input leads to processing deficits of ascending speech signals challenging the formation of robust phoneme representations in long-term memory. Thus, a temporal processing deficit might prevent the uncomplicated acquisition and consolidation of literacy skills as suggested by dominating theories..." (Neef et al., 2017 p. 64).

The dominating theories being referred to in the above quote are the TSF pioneered by Goswami and the work of Tallal who established the idea that auditory processing was intrinsically linked to reading ability (Tallal, 1977, 1980a, 1980b, 2012). In Kraus and White-Schwoch's more recent work, they go so far as to state that "with rare exception, language and literacy development are contingent on auditory processing" (Kraus & White-Schoch, 2017, p. 294).

MUSIC, AUDITORY PROCESSING AND READING

It is not a great leap from establishing that auditory processing is indeed one of the mechanisms behind reading failure to then look at music as a possible remediation method, particularly when so much of the work with temporal processing, is tied up with how students hear the rhythms of the syntax of language. Leong and Goswami's work suggests that in fact dyslexics have great difficulty understanding the rhythmic complexity

of language across a variety of languages other than English (Leong & Goswami, 2014). Tallal herself has been involved in projects that have explored this idea in regard to the enhancement of syllable discrimination, finding that music training could have a beneficial effect (Zuk et al., 2013). Goswami has also continued to explore this key area and is making connections with music training. In his work with Bhide and Power, Goswami also highlights the impact music training can have upon auditory processing and in turn phonological awareness as a student's awareness of the metrical structure of language is improved (Bhide, Power, & Goswami, 2013).

Thus, this ability to keep a beat is seen to be predictive of reading readiness, a child's likely success in phonological awareness and by extrapolation, orthographic mapping (Kraus & Anderson, 2015). Tierney and Kraus go even further, highlighting the impact that musical "entrainment" (moving to a predictable steady beat), in combination with their precise auditory timing hypothesis (PATH) can have upon the phonological awareness and reading abilities of children (Tierney & Kraus, 2014). In a similar manner, the Rhythmic Reading Training program of Antonietti, Bonacina, Cancer, and Lorusso (2015), which used a musical basis to reading training with developmental dyslexics, showed a strong correlation with improvement in reading skills when compared to the control group.

The argument that music can help phonological processes is further assisted, firstly by the work of Brown, Martinez and Parsons (2006) who conducted an extensive study into the overlap between the linguistic and music processing areas of the brain (Brown, Martinez, & Parsons, 2006). This is further explained clearly by Kraus and White-Schoch (See Figure 3.1).



With rare exception, language and literacy development are contingent on auditory processing.

(Kraus & White-Schoch, 2017, p. 294)

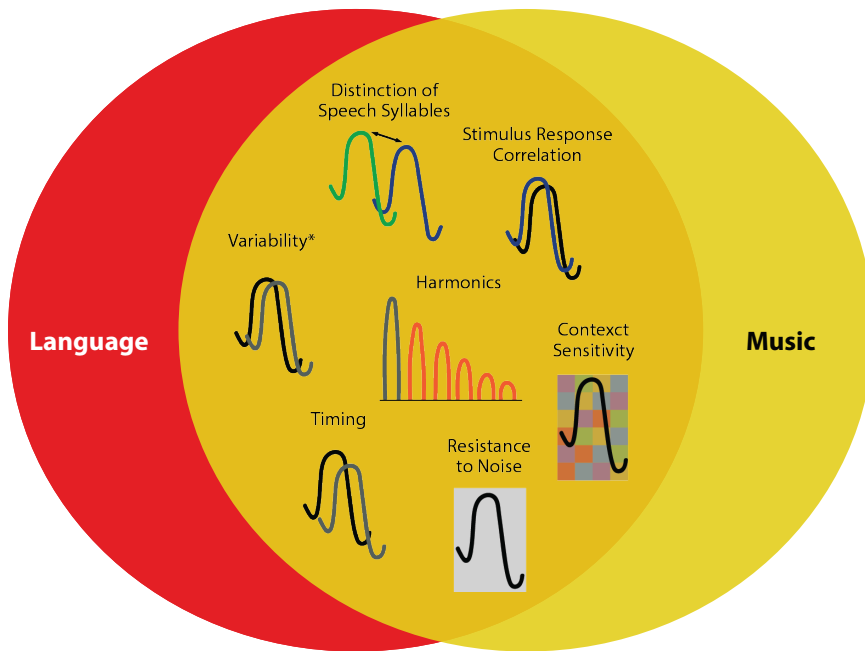


Figure 3.1: The overlap in the music processing and language areas of the Brain
(Kraus & White-Schwoch, 2017, p. 293)

Figure 3.1 can best be understood through Kraus and White-Schwoch’s explanation of the overlap between the neural functions enhanced by music training and those to do with literacy. If a child is to learn to read, they need to understand the sound structure of language, which will allow orthographic mapping to eventually develop. Auditory processing is how the mechanism through which this process is developed, and allows children to develop their inventory of phoneme sounds.

“Specifically, literacy pulls on the ability to distinguish speech syllables, to accurately encode sound features, to adapt to stimulus context, to respond quickly to input, to resist noise degradation, and to process speech harmonics robustly. All of these facets of neural processing are enhanced by music training” (Kraus & White-Schwoch, 2017, p. 293).

The educational importance of filtering background noise (for example, a student’s ability to focus on the voice and conversation of a friend, in a noisy classroom), highlighted as a key component of auditory processing, is also enhanced by music

entrainment (as shown in Figure 3.1). Kraus and Chandrasekaran (2010) give a further important summary of the importance of this skill in the educational setting. The classroom can be a challenging listening environment, and students with learning difficulties are often the students who have most difficulty in filtering noise; thus this skill can be strengthened through music training, allowing them to hear the important things more readily. Strait, Hornickel and Kraus even make a direct connection to reading improvement (Du & Zatorre, 2017; Kraus & Chandrasekaran, 2010; Strait, Hornickel, & Kraus, 2011).

MUSIC AND LANGUAGE

Whilst much of the literature focuses upon dyslexic students, the work of Jentschke and Koelsch, which established a link between music training and the processing of syntax in speech, is particularly useful as it only dealt with neurologically atypical children between the ages of 10-11 years (Jentschke & Koelsch, 2009). Interestingly this follows on from work where the effect of music syntax processing was compared with speech syntax processing in a group of students with a specific language impairment,

which again made a strong case for the coupling or parallel nature of the music and language areas in the brain (Jentschke, Koelsch, Sallat, & Friederici, 2008). Interestingly, these studies shift focus, to working with pitch, and chord progress and less with rhythmic entrainment, highlighting that there could be two mechanisms at play.

Adding to the well-established idea that music training enhances auditory processing, the work of Marie, Magne and Besson (2011) showed a direct link with the way musically trained people heard language. This study, conducted with adults, established that musicians had a more finely tuned awareness of the metrical structure of language, and further heard more clearly differentiation in pitch, within the language (Marie et al., 2011). This finding regarding pitch processing further supports Schön, Besson and Magne's much earlier work with children, who drew a similar conclusion (Schön, Magne, & Besson, 2004).

This work does not stand alone: there is evidence to suggest that even a 20 day music intervention with young children can have a significant impact upon verbal intelligence (Moreno, Bialystok, et al., 2011). Finally, the meta-analysis carried out by Gordon, Fehd and McCandliss demonstrates a clear connection with music instruction enhancing language skills (with a particular focus on phonological awareness and reading). Even more importantly it pointed out gaps in the literature as well as future directions for study, suggesting that the time has come for more specific analysis of the interaction between music and fluency, as well as a more in depth analysis of the specific phonological skills improved through music tuition (R. Gordon, Fehd, & Mccandliss, 2015). Strait, Hornikal and Kraus' study (2015) also found a positive correlation with not only

reading improvement and musical aptitude, but in particular made connections with the understanding of language (Strait et al., 2011). A drawback of this study was that musical aptitude was an initial measurement, rather than a response to intervention (RTI). However, the researchers make the salient point as highlighted in the earlier work by Gordon, that musical aptitude is not fixed, and can increase with exposure to music lessons (E. E. Gordon, 1980); a fact that only serves to highlight the importance of having music programs in schools from the earliest years of schooling.

MUSIC AND PHONOLOGICAL PROCESSING

Studies going back to 2003 show a strong link with music training and improvement in phonological processing. In fact, Overy's (2003) work, which is regarded as seminal in the field of temporal processing, showed that a musical intervention of just 15 weeks can make a difference to both phonological processing and spelling skills. Interestingly, Overy's hypotheses, that "classroom music lessons can have a positive effect on dyslexic children's phonological, reading and spelling skills" (Overy, 2003, p. 498) was tested through different studies, one of which involved a control group. Her conclusions were equally intriguing; she found a strong correlation between phonological skills and spelling, but no improvement in reading. It could be argued at this point that by improving phonological skills, children are in fact addressing the first skill necessary in improving reading (Hoover & Gough, 1990; Hoover & Tunmer, 2018; K. Stanovich, 1988; K. E. Stanovich, 1986). It needs to be noted that for Katie Overy, 'classroom music' involved singing activities that were based in Kodaly pedagogy.

The work of Anvari, Trainor, Woodside, and

Levy (2002) ‘backwards maps’ the issue. Instead of showing that music instruction improves phonological awareness, they instead find that musical perception, as measured through tasks identifying rhythm, pitch and chord processing, related to phonological awareness is predictive of reading skill. They draw the conclusion that these two skills thus share the same auditory circuits. It is therefore not unreasonable to suggest that strengthening musical perception could at the same time strengthen phonological awareness.

Similarly Forgeard et al. (2008) studied the difference in music and phonological processing between normal reading children and those with dyslexia. In much the same way as Overy (2003), Forgeard’s research team designed several studies that established a link between music discrimination skills in both students with dyslexia and students without reading disability and difficulty with phonological skills. Further, two of their studies found that musical ability of dyslexic students was predictive of reading ability (Forgeard et al., 2008). In fact, they even found that dyslexic students had trouble discriminating melody when compared to normal reading children; they ‘hear the world’ very differently. Seeing the strong correlation between phonological skills and music skills they make the understandable suggestion that a “musical intervention that strengthens the basic auditory music perception skills of children with dyslexia may remediate some of their language deficits” (Forgeard et al., 2008, p. 383).

Moritz, Yampolsky, Papadelis, Thomson, and Wolf (2013) posit the interesting question of whether music instruction for pre-readers can assist with phonological awareness. Again, they have made the connection between the auditory processing of

sound and the rhythmic characteristics of music. In short, the studies tracked the connection between phonological awareness and music instruction, with an experimental group who received daily 45 minute music lessons, and a control group who received one 35 minute lesson a week over the course of a school year. To add credence to their study these students were again tested in Year 2. As with most studies of this type, it is impossible to “*prove that rhythmic sensitivity is a precursor skill of phonological awareness*” (Moritz et al., 2013, p. 766). However, strong correlations were observed. Unfortunately, a drawback of these studies was that the experiment and control groups existed in different schools, both with different frameworks for reading instructions and music. The study would have had far more credence if the control had been exposed to the same pedagogy; although it is acknowledged that there are intrinsic ethical issues with running a study such as this in the one school.

Tierney and Kraus have a strong view of the relationship between auditory neural processing and phonological processing. This understanding of phonological processing has fed into their theory of Precise Auditory Timing Hypothesis (PATH) (Tierney & Kraus, 2014), and then into the temporal processing theory (Tierney, White-Schwoch, Maclean, & Kraus, 2017). Their 2013 review of several longitudinal studies led them to the conclusion that “musical training can provide an effective developmental educational strategy for all children, including those with language learning impairments” (Tierney & Kraus, 2013, p. 209). Further, this longitudinal analysis found strong evidence of phonological awareness being strengthened through musical training. Finally, phonological awareness is often seen as an early childhood remediation area, however the 2015

study of Tierney, Krizman and Krauss firmly establishes that a musical invention, including classroom music, can improve phonological awareness for adolescent children. This is heartening news for those children in a classroom where the focus is now upon reading to learn, rather than learning to read.

Moreno, Friesen and Bialystok's 2011 study gave practical demonstration of the difference that music tuition can make to phonological processing. Importantly this study had a control group who participated in an art project. The study does raise the important question of "what is music training", as students were exposed to a computer based training program leaning more towards music theory and appreciation (Moreno, Friesen, & Bialystok, 2011). The study, which had sample sizes of 30 in the Music Group and 30 in the art group, showed a significant improvement in phonological processing skills.

Finally, whilst much of the work in the field of examining the connection between music training and phonological processing focuses upon temporal processing, and by extension the rhythmic aspects of music, the work of Besson, Schon, Moreno, Santos, and Magne (2007) highlights the impact that heightened pitch processing can have on phonological awareness. This further highlights the complexity of both the processes involved in reading acquisition as well as the processes involved in remediating reading difficulties and delay through music tuition.

In addition the study of Habib et al. (2016) presents a strong argument for the use of music as a remediating tool for students with specific language disorders. This study was based in instrumental tuition (piano and percussion), used

small groups. Over a period of just six weeks the researchers found an improvement in reading and phonological skills for the participants who were of kindergarten age. A strength of the study was that it used three testing methods, however this was mitigated by the small sample size and absence of a control group. Of particular note in this study is the research team's willingness to have an open ended approach to the definition of specific language disorder and their ready acknowledgement of the complexity of conditions such as dyslexia, combined with the individual differences of every student.

NEUROPLASTICITY, MUSIC AND READING

"Neuroplasticity can be defined as the brain's ability to change, remodel and reorganize for the purpose of better ability to adapt to new situations" (Demarin, Morović, & Béné, 2014, p. 209), or put another way, "includes all the mechanisms responsible for the brain capacity to change in response to incoming stimulation, our activities and thoughts" (Johansson, 2006, p. 50). To a degree it could be argued that neuroplasticity is the process that drives all of the changes that occur with reading in relation to music. In short, improving auditory processing, language skills, phonological awareness and executive function all rely upon the action of neuroplasticity. The musical brain has proved a fascinating area of study for neuroscientists; and as pointed out by Habib and Besson (2009) is a relatively new area of study. That the musician's brain is so obviously different does point to a level of plasticity; for example, musicians who engage in formal music training before the age of seven, are more likely to exhibit perfect or absolute pitch, and there are obvious structural differences in a musician's brain (Schlaug, 2001). Protzko's (2017) recent meta-analysis even suggests that

“studies involving teaching a musical instrument raised IQ. After correcting for range restriction, this corresponded to an increase of 4.002 IQ points in the population” (Protzko, 2017, p. 96).

The work of Strait, Slater, O’connell, and Kraus (2015) which highlighted the differences in children’s ability to pay focused attention to sound also foreshadows neuroplasticity; the conclusion drawn by the researchers is that music training has changed how the brain ‘hears the world’ (Du & Zatorre, 2017; Kraus & Chandrasekaran, 2010; Strait et al., 2011).

One of the questions that has naturally arisen in the field of music and neuroplasticity is a question almost of what process is driving changes – or rather more colloquially, is it the chicken or the egg. Most studies have been on adult musicians, and one is left pondering - are these biological differences pre-existing; how much musical training is needed to make a change in the brain; what social factors come in to play? (Habibi, Cahn, Damasio, & Damasio, 2016). The longitudinal study of Habibi and others (which is still in progress) establishes the fact that music does indeed make changes in the brain, and this can happen within the first two years of music tuition.

Further, the study which uses the El Sistema framework and is based in low socio-economic areas of Los Angeles definitely deals with the idea that social conditions (better access to education) lead to musical success, and thus neurological change (Hart, Soden, Johnson, Schatschneider, & Taylor, 2013). One of the strengths of this trial thus far, is that whilst not a randomised experiment, it does use two control groups, and the changes have been tracked from a state of no music tuition, to two years of music tuition. The most significant

finding of the study is that 8 year old students in the Music Group had faster auditory processing as measured by cortical auditory evoked potentials when compared to the two other control groups, thus demonstrating a measure of brain plasticity (Habibi et al., 2016).

Similarly, the Moreno et al. (2009) study of 8 year old non-musician children of normal intelligence, without learning difficulties, also suggests music training promotes neuroplasticity. These students, who were pseudo randomly assigned to groups that participated in music or art also demonstrated evidence for music tuition promoting neuroplasticity. This study measured data using event related potentials (ERP) and magnetoencephalography (MEG). As prior musical experience was controlled for (by only allowing students into the trial who were not learning music), the results are particularly reliable. Further, as the music intervention group was compared with a group who completed artistic activities, differences attributable directly to music can be ascribed. Finally, this study also provided solid evidence that a mere six months of music training can have not only show evidence of neuroplasticity as a result of a musical intervention, but that plasticity itself was directly connected to improved reading outcomes (Moreno et al., 2009).

Strengthening the idea of music’s ability to help form new neural pathways in relation to language is the recent study of Dittinger, Chobert, Ziegler, and Besson (2017), again using ERPs, which established the idea that increased auditory perception in students between 8 and 12 years old who had had an average of four years formal music training were able to form stronger semantic memory when compared to students

who participated in alternative extracurricular activities. When compared to a similar previous study of adults (Dittinger et al., 2016), they make the case that these neural pathways may in fact be enduring into adulthood.

Habib et al. (2016) take this idea further and apply it to students with specific language learning disorder (including dyslexia), highlighting the structural differences that have now been found in a dyslexic's brain through functional magnetic resonance imaging (fMRI). This drew the understandable conclusion that for some students, remediating language involves helping the brain make connections between frontal and temporal language areas. In layman's terms, both of these areas are working, however for the student with a specific learning disorder such as dyslexia, they are not communicating with each other effectively (Boets et al., 2013). Because of the overlap in this area, music can help develop new pathways for this to develop (Habib et al., 2016).

In any discussion on neuroplasticity and music, it is impossible to ignore Patel's OPERA hypothesis (2011). This is particularly helpful as it not only lays out a rationale and conditions neuroplasticity, but also makes a strong case for why music has an impact on student's understanding of language, and by extension reading. These are:

1. OVERLAP: *there is anatomical overlap in the brain networks that process acoustic features used in both music and speech (e.g waveform, periodicity, amplitude envelope).*

2. PRECISION: *music places higher demands on those shared networks than*

does speech, in terms of the precision of processing.

3. EMOTION: *the musical activities that engage this network elicit strong positive emotion.*

4. REPETITION: *the musical activities that engage this network are frequently repeated.*

5. ATTENTION: *the musical activities associated with this network are associated with focused attention.*

(Patel, 2011, p. 1)

Patel draws the natural conclusion that these conditions force the networks to operate at a higher level than is required for speech, "yet since speech shares these networks with music, speech processing benefits"

(Kraus & White-Schoch, 2017, p. 294)

Patel draws the natural conclusion that these conditions force the networks to operate at a higher level than is required for speech, "yet since speech shares these networks with music, speech processing benefits" (Patel, 2011, p. 2). Patel's expanded OPERA hypothesis (2014) extends this idea beyond sensory processing to cognitive processing. He suggests that when music training places higher demands on sensory and cognitive processing than speech, the conditions for brain plasticity are met, which thus enhances

speech processing and by extension reading skills. Tierney and Kraus (2014) highlight the complexity of the OPERA hypothesis, when they also acknowledge the motivational impact that the emotional aspects of music training can have. Music is often an activity where students become more invested and their strong positive emotions can work positively upon engagement (Tierney & Kraus, 2014). In fact Kraus and White-Schwoch (2015) even go so far as to argue that auditory training that does not engage the reward systems will not promote the neuroplasticity necessary for language improvement. It is interesting to note that Patel does give a broad definition of musical training (an area of vagueness common to many of these studies) which involves learning a musical instrument, rather than just 'music activities' (Patel, 2012a; Patel, 2011; Patel, 2012b, 2013). Slevc and Okada (2015) argue that the OPERA hypothesis works not because the brain uses similar networks for music and language, but suggest that music and cognition recruit these same networks, possibly providing a basis for the claims that music training can lead to higher IQ (Rebuschat, Rohrmeier, Hawkins, & Cross, 2012; Reybrouck & Brattico, 2015; Sala & Gobet, 2017; Slevc & Okada, 2015).

The work of Wang, Osher, and Reuter-Lorenz (2015) contributes further to the idea of neuroplasticity, as they argue that children's brains before music training are similar; in fact it is the music training that makes the difference. They also hone in on the area of attention in Patel's OPERA hypothesis, and argue that those who are music trained have superior focus and response in attention-based timing tasks. They argue that this facet leads to improved cognitive performance (Wang et al., 2015). It can be argued that by extrapolation, this improved performance,

combined with neuroplasticity can provide the conditions for enhanced reading performance.

EXECUTIVE FUNCTION AND MUSIC

One last significant area is the interaction of music tuition and executive function (EF). EF has a known impact on IQ points and reading skill, with a wealth of research exploring this area. EF can be understood as the neurocognitive processes involved in independent goal directed behaviours, and emotion that allows for adaptation to fluctuating environmental demands. It includes working memory, attention control, response inhibition, and thoughtful planning of future actions (Ahmed, Tang, Waters, & Davis-Kean, 2019, p. 446). In other words, the ability to focus upon a task, to hold things in working memory as attention deliberately shifts between tasks, and the ability to problem solve (Jacobson et al., 2017). Okada and Slevc (2018) helpfully summarise the areas of executive function as: inhibitory (the ability to exercise self-control), shifting, (cognitive flexibility) and updating (working memory) (Okada & Slevc, 2018, p. 1077).

Whilst it is acknowledged that the simple view of reading is the predominate theory in circles examining reading acquisition, and that this approach places an emphasis on language, executive function deficits may explain reading failure for those students who have a strong grasp of both listening skills and language. Cirino et al.'s (2017) explanation takes it even further, dividing the area into self-regulated learning (SRL) and EF. This study also found EF impacted reading acquisition, although it was not able to pinpoint the mechanism, only observing that students with stronger EF had improved reading scores; particularly when dealing with text (Ahmed et al., 2019; Cirino et al., 2017; Cirino & Willcutt, 2017).

Jacobson et al. (2017) make the helpful distinction that EF is contributing to the top – down skills necessary for reading; perhaps it is EF that could explain those students who have seemingly reasonable fluency and decoding skills yet still struggle with the core aspect of reading comprehension. This also resonates with the work of Cutting et al. (2009), who also argue that EF has a particular impact on reading comprehension. The recent research of Berninger, Abbott, Cook, and Nagy (2017) points out that EF could be the mediating factor or link creating links between multi-levelled language systems such as reading, writing, and aural language systems (Berninger et al., 2017, p. 446).

The updating or working memory area of EF is seen by many as a contributing factor to reading comprehension skills (Ahmed et al., 2019; Davidson, Kaushanskaya, & Ellis Weismer, 2018; García-Madruga et al., 2013; Hjetland et al., 2018; Jacobson et al., 2017; Lam et al., 2017; Lervåg et al., 2018; Nouwens, Groen, & Verhoeven, 2017). The work of Kempert et al. (2016) which was quite rigorous in design (though working with German speaking students) was particularly interesting, as it showed a link between stronger updating skills and phonological processing. Again this study raises questions around what kind of music, and when music instruction needs to happen for true effect to be measured. They do raise the interesting conundrum of measuring the effects of musical interventions with students in early childhood. As this is such a music rich teaching environment to start with, perhaps it is better to hold these studies over until upper primary years (Kempert et al., 2016, p. 14).

Clayton et al. (2016) found that expert musicians did have improved auditory working memory, an

aspect of executive function, however they could draw no conclusions as to causality, whether music had promoted improvement in this area or whether it was actually a requirement itself for musical success. A large problem with this study was that whilst comparing expert adult musicians with non-musicians, it was retrospective and there was no intervention, so it simply gave us a picture of how musicians and non-musicians perceive sound in noisy environs. Similarly the work of Okada and Slevc (2018) found a strong correlation between working memory and music instruction, but had the same conundrum; did students persist with music lessons because they had strengths in updating (working memory skills) or were these skills stronger due to music lessons? This also correlated with the earlier work of Slevc, Davey, Buschkuehl, and Jaeggi (2016), where it was found that musical ability was associated with updating or working memory abilities. This study was also correlational in nature, and dealt with the experience of adults. This study's subjects were not expert musicians, and part of the study tested their musical ability. They draw the reasonable conclusion that “musical experience could influence working memory abilities outside the musical domain” (L. R. Slevc et al., 2016, p. 208).

In contrast, the Moreno, Bialystok, et al. (2011) study worked with children between 4 and 6 years old, examining the impact of short term music, and art instruction on EF. They found a very strong relationship between music instruction and language skills as well as a very high correlation in the improvement in EF within the Music Group, a correlation not replicated by the art group. It is interesting that the training programs were computer based, and whilst involving rhythm activities and melody activities, did not involve instrumental music instruction.

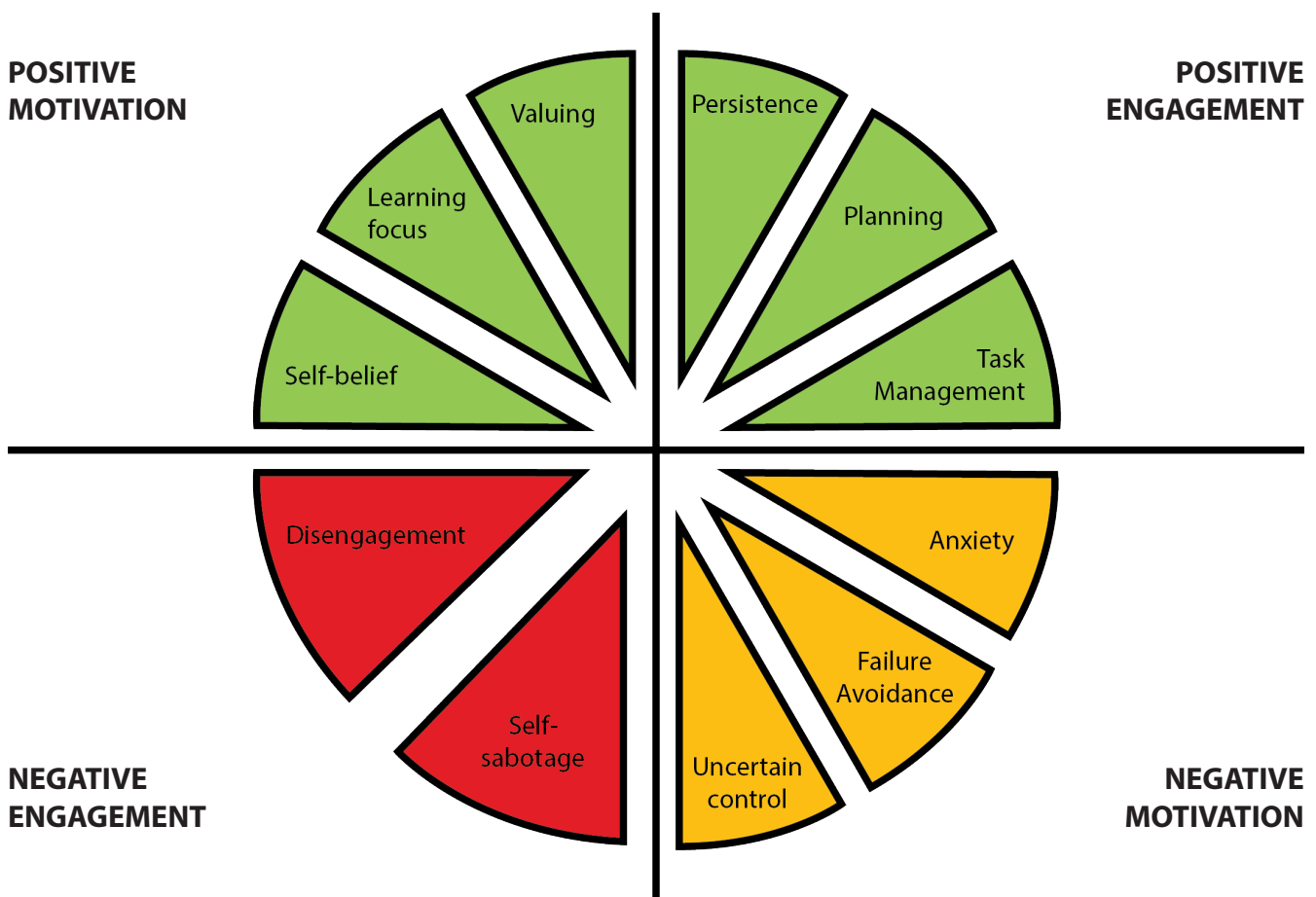
The research of Degé, Kubicek, and Schwarzer (2011) also supports the idea that music tuition strengthens executive function. They argue that the link between music and academic performance, is EF. Refining this idea further, George and Coch (2011) argue that it is the working memory area of EF that mediates the improvements in cognitive skills that seem to correlate with music training. The strength of this study was that it used a combination of behavioural measures and ERPs to measure change, which demonstrated a more rigorous approach to the research question. In light of all of this, it is not unreasonable to draw the conclusion that strengthening executive function, in particular the skill of updating (working memory) through music tuition could in turn strengthen reading skills in students who are struggling to read.

MOTIVATIONAL AND STUDENT SUCCESS

It was never the intention of the research team to examine motivation theory as part of this study. However as the project progressed it became clear that the motivational profile of students had a significant impact upon their success within the project. For the purposes of the research project, the Motivation and Engagement Wheel (Figure 3.2) pioneered by Martin, has been used as the basis of discussion. In summary, Martin's theory of motivation divides motivation and engagement into positive and negative quadrants, with motivation described as being driven by behaviours and engagement being driven by thoughts. The Wheel comprises:

- a) Positive Thoughts (Positive Motivation): Self-belief, Valuing, Learning Focus
- b) Positive Behaviors (Positive Engagement): Planning, Task Management, Persistence
- c) Negative Thoughts (Negative Motivation): Anxiety, Failure Avoidance, Uncertain Control
- d) Negative Behaviors (Negative Engagement): Self-sabotage, Disengagement

Figure 3.2 - Andrew Martin's Motivation and Engagement Wheel (Martin & Lifelong Achievement Group 2013)



It is interesting to note that Martin's earlier iteration of the wheel used slightly different language particularly in the positive motivation quadrant where self-belief is identified as self-efficacy, and learning orientation is identified as mastery orientation. The obvious implication is that by giving students mastery experiences, and building their specific self efficacy in an activity, they will be more likely to remain engaged. The negative motivation quadrant points to the need for students to experience success in activities and have a measure of autonomy in order to remain engaged in the classroom (Martin 2007).

MOVING FORWARD

Throughout this examination of the literature, there seems to be ample evidence to suggest that music training functions in a similar area of the brain as language processing and could have positive effects upon reading instruction. Whilst it is acknowledged that music instruction cannot replace the essentials required for early reading acquisition, a case can be made that music tuition can enhance several pre-reading skills such as language processing, auditory processing skills, and phonological understanding. There is also a body of research suggesting that music entrainment can promote neuroplasticity and stronger EF – particularly in the working memory/updating aspect. These are all skills that tap reading skills. It is a natural progression to hypothesise that music training could help children with a specific learning difficulty in reading. However, at this stage it is a research area that needs to be more fully explored, particularly in the age group of upper primary, pre-adolescent and early adolescent children. Further the area needs research that has a strong definition of music training, which will add weight and credence to any discoveries.

Particularly interesting is that fact that most of the literature looking at the interaction between music and reading has focused upon ‘pre-reading’ skills (ie phonological awareness, or auditory processing). It seems the field is ripe for a study that focuses upon music training and actual improvement in reading ability, whether this be measured through tests of reading comprehension (verbal or written) reading fluency rates, or even just growth in vocabulary. A study that compared

students without learning difficulties associated with reading, with those that do; or a design that compared two cohorts SLD, would be a significant addition to the literature. If these types of studies had positive findings it would give significant impetus to rethinking exactly how struggling readers could be remediated whilst at the same time enhancing the status of music in schools.

We are confident that the Carinya Research Project addresses some of the gaps in the literature, by specifically addressing the question of how does a ‘real world’ music intervention help struggling readers. Further by working with students of middle school age we broaden the literature base. It is acknowledged that the work of El Sistema also works with students in this age group, however our point of differentiation is that our students are not ‘disadvantaged’ students, rather they are students who struggle to read.



Aims and Research Questions

AIM

**TO DISCOVER THE IMPACT OF DIRECT INSTRUMENTAL
MUSIC INSTRUCTION UPON STUDENTS WITH LEARNING
DIFFICULTIES ASSOCIATED WITH READING.**

RESEARCH QUESTION

Does specific small group instruction (25 minutes per week), combined with one large ensemble lesson (45 minutes) specifically impact reading comprehension of students of middle school age (Years 5-8), who have learning difficulties associated with reading, in a NSW school?

METHODS AND DATA COLLECTION APPROACHES

METHODOLOGY

The research used a mixed methods approach, as factors such as student engagement with the intervention, family situation, relationship with teachers, relationship with peers can all impact upon learning areas such as reading progress. At the same time, actual progress in reading improvement is a quantitative measurement. Thus it was recognised that a mixture of both qualitative and quantitative data would give a more global picture of a student and be particularly useful for this project.

RESEARCH DESIGN

A longitudinal cohort study approach was used for this study, conducted over an eighteen month period. It compared the progress of two groups of students drawn from years 5 - 8 within Carinya Christian School:

- Music Group (low ability readers)
- Control Group (low ability readers)

The Music Group and the Control Groups were originally made up of 30 students, with equal students across the year groups. The group size of 30 students was selected, as it was believed that this would accommodate any attrition rate that occurred over the course of the study. A group size of less than 20 students would be regarded as too small. Students to be excluded from the data sample will be those already receiving music

tuition, and those who arrived at the school after the commencement of the study. The use of one school only, controls for consistency of reading instruction.

The intervention ran for the three terms of the school year in 2018 and until June in 2019, with the same cohort. The study is a correlational rather than causational study. As students in both the Music Group and the Control Group are identified as low ability readers, it is impossible to prove reading improvements are due to one specific intervention, as these are all students who are receiving classroom reading interventions. The improvements will be looked for as rates of growth as measured in growth in percentiles as measured by the PAT-RC test and improvements in reading age as measured by the PROBE 2 Reading Comprehension Assessment.

As the same factors are being sampled at different points in time, this study could also be described as a “trend study”. It should be noted that the British definition of Cohort study is being used, ie the sample groups will remain unchanged for the duration of the study (Cohen, Manion, & Morrison, 2007).

The longitudinal cohort design was chosen as it will be difficult to demonstrate the impact of music tuition on a skill such as reading over a

short period of time. The variables other than the music tuition intervention were controlled for by having two cohorts of low ability readers with similar characteristics, from within the same school environment and receiving the same classroom instruction for reading.

INTERVENTION DESIGN

At its most basic level the intervention design was one where the students received instrumental tuition in concert band instruments (flute, clarinet, alto sax, trumpet, baritone horn, bass guitar). This tuition was delivered in small groups (two to three students). Students also participated in one large ensemble lesson every week. Each week every participant was involved in one twenty-five minute small group music lesson and one forty-five minute ensemble lesson. Groups were formed around like instruments, and the timetable of these music lessons rotated ensuring that the general disruption to the life of the school was minimised.

The intervention ran for eighteen months, beginning in March 2018 and concluding in August 2019. The school uses Progressive Achievement Tests in Reading and Comprehension (PAT-RC) to measure reading achievement. PAT-RC tests, produced by the Australian Council of Educational Research (ACER) have been selected as they use Australian norms and their percentile bands are considered to be reliable by the educational community. Carinya Christian School uses PAT-RC at regular intervals in the school teaching and learning cycle, i.e. in the first two weeks of Term 1 each year and in the last two weeks of Term 3 each year. For the purposes of the project, that assessment cycle of PAT-RC was altered in to the last week of Term 2 in 2019. Thus, the school had baseline measurements of reading

ability at the beginning of the project. In fact two measurements were available; one several months before the intervention and one that correlated quite closely with the start of the intervention. Then, as the project progressed, three further measurements of reading progress were taken using the PAT-RC test.

All students in the intervention cohort were tested using the PROBE 2 Reading Comprehension Assessment, in order to triangulate the results of the Music Group. This test was administered as a pretest in March 2018, and then as a post test in October 2018, and June 2019. Due to the time constraints associated with PROBE 2 (it takes approximately 1 hour to administer the test per student, and is administered on a 1 on 1 basis) PROBE was not used with the Control Group.

The intervention would be too simplistic if it merely measured a student's growth in terms of PAT percentiles. Thus, the research design also incorporates surveys of teachers and interviews with students. Students were interviewed at the beginning of the project using a structured interview format. The first interview was designed to add depth to demographic data concerning the student and gain a picture of their reading background. In September 2018 students completed semi-structured interviews (See Appendices 10 and 11 for interview questions). These interviews were designed to assess issues such as a student's level of engagement in school and in the Music Project. Teachers completed a survey of their impressions of the student as a learner in September 2018 and August 2019. The researchers hoped that the surveys would give a more holistic picture of the students involved in the project.

As much data as possible around each student in the project was collected and a profile of each student was developed. For instance, their home situation, school reports, school attendance and significant life events is included in the discussion.

The acquisition of reading is complex and all of these factors can have some impact upon a student's story. Further, many of these factors can inform and/or mediate the success of the project.

PARTICIPANTS

The participants in this project were students who were identified with reading difficulties through a combination of internal measures such as school reports and external measures such as PAT testing and NAPLAN data. Whilst the internal profile of each student gave a holistic picture of each student, ultimately a PAT-RC score in the 31st percentile or lower was the qualification for entry into the cohorts.

The cut off of the 31st percentile was chosen as it caught the upper end of students who were struggling readers - these students were just in Stanine 4, and regarded as "low average". This can be seen in figure 4.1 (PAT norms 2016) which gives the PAT-RC norms for test 6 - which was administered to students in Year 7. According to the PAT achievement bands, these students are still struggling with skills one would generally expect students of this age to be proficient in (ACER, 2019).

The project began with 30 participants in the Music Group. Of the original 30 participants, there were 18 boys and 12 girls. At the initiation of the project the youngest child was 10 years old and the oldest was 14. These students were spread from Years 5 through to Year 8. By the conclusion of the project these same students were in Years 6

to Year 9.

The project did see some attrition through lack of interest and motivation. In addition the project was affected by students relocating. Two students moved schools and five students withdrew citing lack of interest, leaving the final sample size at 24. Within the remaining group several students did not participate fully for the length of the project due to events such as a broken limb interfering with lessons for more than a term, or family holidays impacting school attendance. By the end of the project it was decided that students to be included in the data analysis of the Music Group, needed to have attended the intervention at least 50% of the time.

The Control Group began with 26 participants. Although it was the intention of the researchers to have equal numbers, it was difficult to generate completely even groups using "the below 31st percentile cut off". Further, students learning a musical instrument were excluded from inclusion in the Control Group. As the project progressed, three members of the Control Group began music lessons and were thus excluded from the data. Further, three Control Group members left the school around the halfway point of the project.

Figure 4.1 PAT-RC - Test Score Conversion Table

Test 6 score conversion table (2018 norm update)								
Test raw score	Scale score (patc)	Error (patc)	Year 5 Percentile	Year 5 Stanine	Year 6 Percentile	Year 6 Stanine	Year 7 Percentile	Year 7 Stanine
34	172.0	>8.7						
33	160.5	8.7	99	9	99	9	99	9
32	154.9	6.9			98		96	
31	151.0	5.9	98		96		93	8
30	147.9	5.4	96		94	8	89	
29	145.4	5.0	94	8	91		85	7
28	143.1	4.7	92		88		81	
27	141.1	4.5	90		84	7	76	
26	139.2	4.3	87		80		71	6
25	137.5	4.2	84	7	76		66	
24	135.8	4.1	81		71	6	61	
23	134.2	4.0	77		67		56	
22	132.7	3.9	73		62		52	5
21	131.2	3.9	69	6	57		47	
20	129.7	3.9	65		53	5	42	
19	128.3	3.8	61		48		38	
18	126.8	3.8	57		43		34	4
17	125.4	3.8	52	5	38		29	
16	124.0	3.8	48		34	4	26	
15	122.5	3.9	43		29		22	
14	121.0	3.9	39		25		19	3
13	119.5	3.9	34	4	21		16	
12	118.0	4.0	30		18	3	13	
11	116.4	4.1	26		15		10	2
10	114.7	4.2	22		12		8	
9	113.0	4.3	18	3	9		6	
8	111.1	4.4	14		7	2	4	
7	109.2	4.6	11		5		3	
6	107.0	4.8	8	2	3		2	
5	104.6	5.1	5		2			1
4	101.9	5.5	3					
3	98.7	6.1	2			1		
2	94.7	7.0		1	1		1	
1	88.9	8.8	1					
0	77.2	>8.8						

This table demonstrates the relationship between PAT-RC test scores and the conversion to Stanine and Percentiles according to School Year Group.

There were eight females and twelve males in the Control Group, with nine females and eleven males in the Music Group. In the Control Group there were four students in Year 5; six students in Year 6, six students in year 7 and four students in Year 8. In the Music Group, there were six students in Year 5, five students in Year 6; five students in Year 7, and three students in Year 8. The original project design was to have the project work across two or three year groups, however, a desire to have a statistically larger experiment drove the decision to expand the project up to Year 8. At the beginning of the project, ages ranged from

ten years and one month up to fourteen years and six months. Of the students in the music cohort, two students had no diagnosed learning difficulty, three had learning difficulties associated with expressive and receptive language, two students had the diagnosis of dyslexia, three students were diagnosed with ADHD, ten students had an ‘unspecified’ learning difficulty and two students had no diagnosed learning difficulties. The Control Group told a similar story: five students had expressive and receptive language disorders, one dyslexia, three with an unspecified learning difficulty, six with ADHD, and five students had no diagnosed learning difficulties.

RECRUITMENT

In February 2018 a broad invitation was given via letter to parents of students who fell under the 31st percentile cut off. The invitation letter contained project information for both parents and students. If students and parents were interested in being involved in the program they were invited to a “Come and Try Night”, at which the broad aims of the project were explained to both parents and students. Consent forms were signed and students at this point chose instruments after trying the selection of instruments available for the project. It was made clear to both students and parents that they could leave the project at any time. As these students were low ability readers, steps were taken to ensure that they comprehended the information letter. The control cohort was not contacted, as the data being used is already part of the day to day of school life. Approximately eleven students who were given the initial invitation to the “Come and Try Night” declined to be involved.

ETHICAL CONSIDERATIONS

The project was completed with Ethics approval from the University of Canberra. This institution was chosen as Dr Anita Collins had a close association.

The approval number for the project is **20180118** (See Appendices 3-9 for ethics documentation).

Involvement in the intervention cohort was completely voluntary. For all participants there were no out-of-the-ordinary risks associated with this research project. However, it is acknowledged that new experiences have the potential to make children uncomfortable. All reasonable steps were taken to minimise this and as with all research, participants were free to withdraw from the project at any time and without penalty. Students and parents all completed consent forms, and care was taken to ensure that the consent form was comprehended.

The researcher and interviewers were trained explicitly in the testing and interview procedures. Interviews were conducted by a neutral person who was distant from the research in order to distance themselves from the perception of an unequal relationship. The researcher and interviewers were providing small group tuition to minors and at times conducting interviews one on one which raises issues of child protection. To minimise this risk the researcher and all tutors involved in the project were trained in child protection protocols and have a working with

children (WWC) clearance number. Further, all tuition and interviews were conducted in public locations within the school, in rooms with glass windows, with open blinds.

The risks to others in this research were low, however it needs to be acknowledged that learning musical instruments has the potential to create discomfort and annoyance in the home, thus creating a risk to parents and other siblings in the home. Further, learning a musical instrument also has at times the potential to create frustration, and discomfort when learning plateaus. To minimise this risk the researcher again kept open lines of communication with parents and students and emphasized an encouraging approach to their teaching.

To protect students' identity and confidentiality, all students in all cohorts have been given a unique code. This code has been kept in a locked filing cabinet, and will be destroyed seven years after the conclusion of the study. Any electronic data has been de-identified and kept on password protected file on the school's server.

RESEARCH PROCEDURE

In May 2018 students in the Music Group were given musical instruments, and divided into small groups. Initially there were twelve small groups for music instruction and groups were matched to instruments, and where possible age. The ‘Essential Elements’ band method was used to generate repertoire. However, due to the particular nature of the flute, these students also used “Fun Pieces for Flute”. Being a school where an Orff Schulwerk philosophy is predominant, wherever possible students learnt first through singing. Students learnt ‘solfa’ names as well as curwen hand signs in order to give a kinaesthetic element to lessons. Lessons incorporated movement as it was felt that this allowed students to embody their understanding (Staveley, 2011). Ensemble tuition was also begun. Again this tuition incorporated movement, solfa and hand signs to reinforce learning. The music tuition component of the project continued relatively unchanged throughout the process. Lead researcher, Debra Batley, has taught most of the small group instrumental tuition. Project team member, Lauren Ferguson joined Debra in presenting ensemble tuition, which has been ‘team taught’. In May 2019 timetabling and rooming clashes resulted in Debra Batley taking responsibility for the ensemble tuition. During the course of the project students completed Book 1 of the Essential Elements method for Band, learning over 180 pieces of repertoire.

All students in Years 3-10 completed PAT-RC tests in October 2017 and January 2018. The initial cohort selection was informed by PAT

tests completed. Follow up PAT-RC tests were administered in October 2018 and June 2019. PAT-RC tests were completed using an online platform and were administered by the English teachers in the students’ regular English lessons (See Appendix 2 for example of PAT - RC test).

Students in the Music Group completed PROBE 2 Comprehension Assessment which assisted in triangulating PAT data. PROBE 2 creates a running reading record, and an analysis of a student’s comprehension skills. At the completion of a PROBE 2 assessment students are given a ‘reading age’. PROBE 2 is administered one on one: the student reads a passage and comprehension questions silently, then aloud to the teacher, who keeps a running reading record. The student then verbally answers comprehension questions. The teacher is not able to give any assistance to the student. All PROBE 2 tests were administered by the lead researcher, Debra Batley in order to provide consistency of administration. PROBE 2 was completed in March 2018, October 2018 and August 2019. (See Appendix 1 for example of PROBE 2 test).

Interviews were also conducted throughout the project. In May 2018, students in the music intervention completed a “pre-interview” which provided a background on the student’s perception of school, their reading background and a little of their motivational profile (See Appendix 10 for interview questions). A follow up semi-structured interview was completed in October 2018, with final interviews completed in June 2019. The 1st

two interview rounds were conducted by Annette Tumbridge, a teacher's aide in the school known for her exceptional rapport with students. The final round of interviews was conducted by Erin Carter, a teacher's aide who only worked with Junior School students and as such was seen as a more 'neutral' figure in the interviewing process. The interviews were video recorded and then transcribed by two administrative assistants (See Appendix 11 for interview questions).

Teachers were also surveyed to gain a full picture of the student's profile. These surveys were administered using a google form and were delivered via email. Teachers completed a survey for every student that they taught within the project and an additional survey to gain insight into the reading strategies incorporated into their teaching. The teachers were surveyed twice: once in October 2018 and a second time in August 2019 (See Appendix 12 for survey questions).

DATA ANALYSIS

All quantitative data was analysed using SPSS 25.0. All PAT-RC results and PROBE 2 test results were treated as quantitative data. The data was used to create descriptive statistics, and through this, effect sizes were calculated using Cohen's D. A focus of the quantitative analysis was comparing any improvement between the pre-test stage of the project and post-test reading scores. All structured interviews and survey responses were analysed and coded for themes, both within and across responses. NVivo software was used in

the process of coding interviews and surveys. The themes which emerged in the data analysis were used to gain a picture of students' engagement in the project, their engagement in the process of reading and their engagement in general school life. A focus of the qualitative data analysis has been understanding student's learning profiles, and gaining insight into their ongoing engagement levels of the project. The emergent themes were noted with reference to the research question.



Results and Findings

PAT TEST RESULTS

PAT-RC results were interpreted using qualitative statistical analysis. The software used was SPSS 25.0. The data was analysed using two independent variables: Music Group and Control Group. Three dependent variables were analysed: the pre test, the mid test and the post test. Between group differences of the pre test were analysed using an independent variable T-test to establish that there was no significant difference between groups at the start of the intervention. The post test and mid test group differences and effect sizes were analysed using one way ANCOVA.

There were 20 Music Group participants and 20 Control Group participants. An independent-samples t-test was run to determine if there was a statistical difference between groups' PAT-RC pre-test percentile scores. There was one outlier in the data, as assessed by inspection of a boxplot, however this outlier was retained as when the test was run both with transformed data, and with

the outlier removed, there was no significant difference to the results. Reading scores for each group were not normally distributed, as assessed by Shapiro-Wilk's test ($p = .005$), and there was homogeneity of variances, as assessed by Levene's test for equality of variances ($p = .099$). There was no statistical difference between groups: Music Group ($M = 8.57$, $SD = 7.86$) Control Group ($M = 11.24$, $SD = 10.17$). $M = -2.67$, 95% CI [-8.33, 3.00], $t(40) = -.951$, $p = .347$.

The ANCOVA test was used to analyse the effect of the intervention between pre test and Post Test. There was a linear relationship between pre and post intervention reading scores, as assessed by visual inspection of a scatter plot. There was homogeneity of regression slopes as the interaction term was not statistically significant, $F(1, 37) = .352$, $p = .556$. Standardized residuals for the interventions were normally distributed, as assessed by Shapiro-Wilk's test ($p > .05$). There

was homogeneity of variances, as assessed by Levene’s test of homogeneity of variance ($p = .085$). There was homoscedasticity, as assessed by visual inspection of the standardized residuals plotted against the predicted values. There was one outlier in the data, as assessed by standardized residuals greater than ± 3 standard deviations. This outlier was kept in the analysis as when the ANCOVA test was carried out with both the outlier transformed and then removed, the results were not materially affected. Adjusted means are presented, unless otherwise stated. Post Test reading percentiles were higher in the Music Group ($M = 27.27$, SE

$= 2.12$) compared to the Control Group ($M = 14.04$, $SD = 2.119$). After adjustment for pre-intervention reading percentiles, there was a statistically significant difference in post-intervention reading percentiles between the interventions, $F(1, 37) = 19.42$, $p < .001$, partial $\eta^2 = .344$. Post hoc analysis was performed with a Bonferroni adjustment. Post Test PAT-RC reading percentiles are statistically significantly greater in the Music Group compared to the Control Group ($M_{diff} = 14.035$, 95% CI [7.146, 19.313], $p < .001$). (See also Table 1).

Table 1

Adjusted and Unadjusted Intervention Means and Variability for Post-Intervention Reading Percentile Scores, with Pre-Intervention Reading Percentile Scores as a covariate.

	<i>N</i>	<i>Unadjusted</i>		<i>Adjusted</i>	
		<i>M</i>	<i>SD</i>	<i>M</i>	<i>SE</i>
Control Group	20	14.45	9.03	13.92	2.96
Music Group	20	27.15	11.59	27.67	2.96

Note: N = number of participants, M = Mean, SD = Standard Deviation, SE = Standard Error. Reading scores are reported as percentiles on a scale from 0-100.

Effect size was calculated using Cohen’s D : $d = \frac{|M_1 - M_2|}{S_{pooled}}$

A very large effect was seen when the Music Group ($N = 20$, $M = 27.15$, $SD = 11.59$) was compared to the Control Group ($N = 20$, $M = 14.45$, $SD = 9.03$). Unadjusted means were used in calculations, $d = 1.22$ indicating a very large effect size.

Effect size was $d = 1.22$, indicating a very large effect size.

Almost all students in the Music Group showed an improvement in their PAT-RC percentile results, whilst the same improvements were not observed in the Control Group, reflecting that the Music Group experienced a level of catching up with peers that the Control Group did not experience. This is best seen in Figures 5.1 and 5.2.

Figure 5.1 - Music Group Results

Music Group Range of Results at Conclusion of the Project.

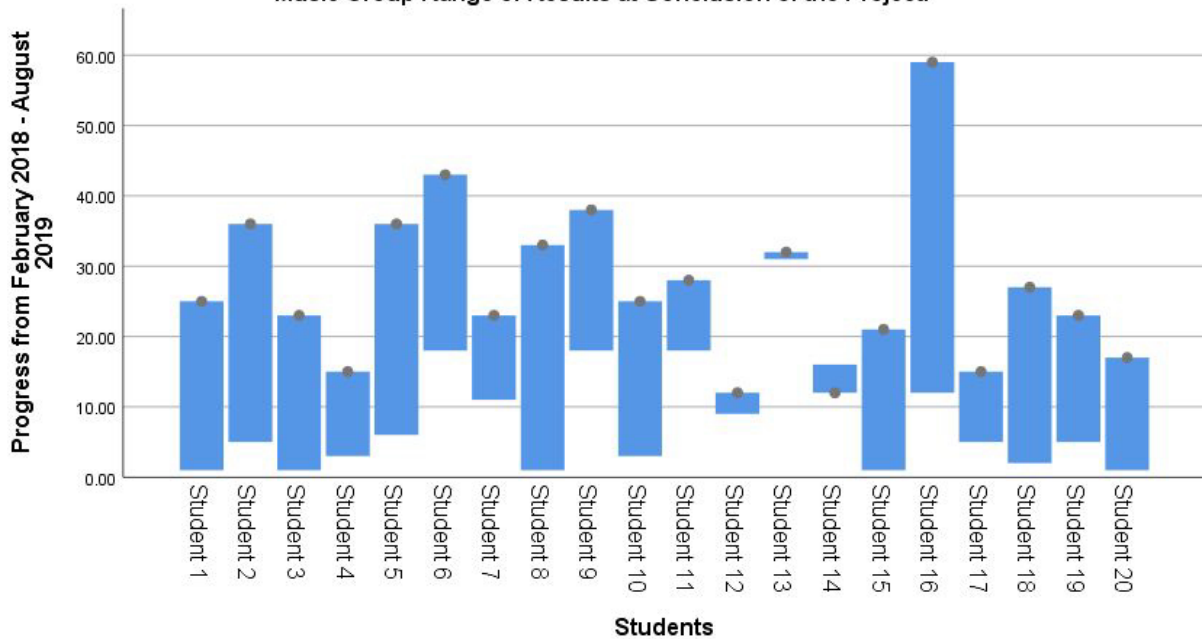
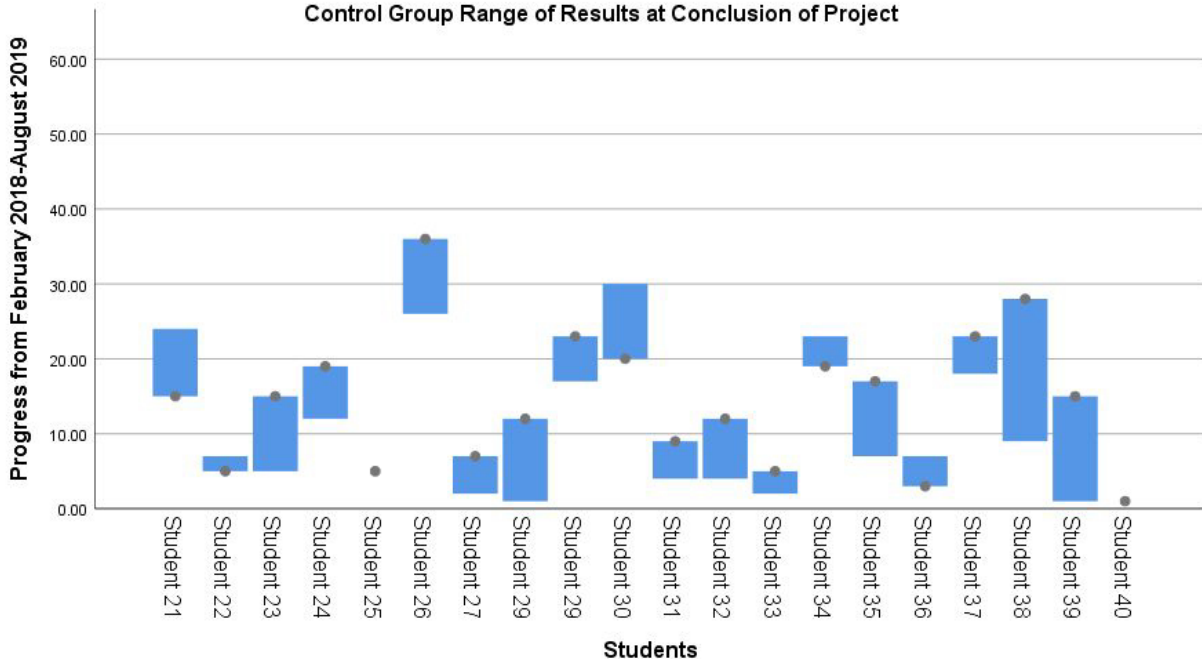


Figure 5.2 - Control Group Results

Control Group Range of Results at Conclusion of Project



Figures 5.1 and 5.2 indicate the growth or lack of growth in children’s reading skills over the course of the project. Each bar in the chart represents the high and low point of reading percentile results as measured by PAT-RC. The ‘dot’ represents the test result in 2019 at the conclusion of the project. If no bar exists it is an indication that the results did not change between the pre-test and the post-test.

Figure 5.3 - Music Group results at the Halfway point of the project

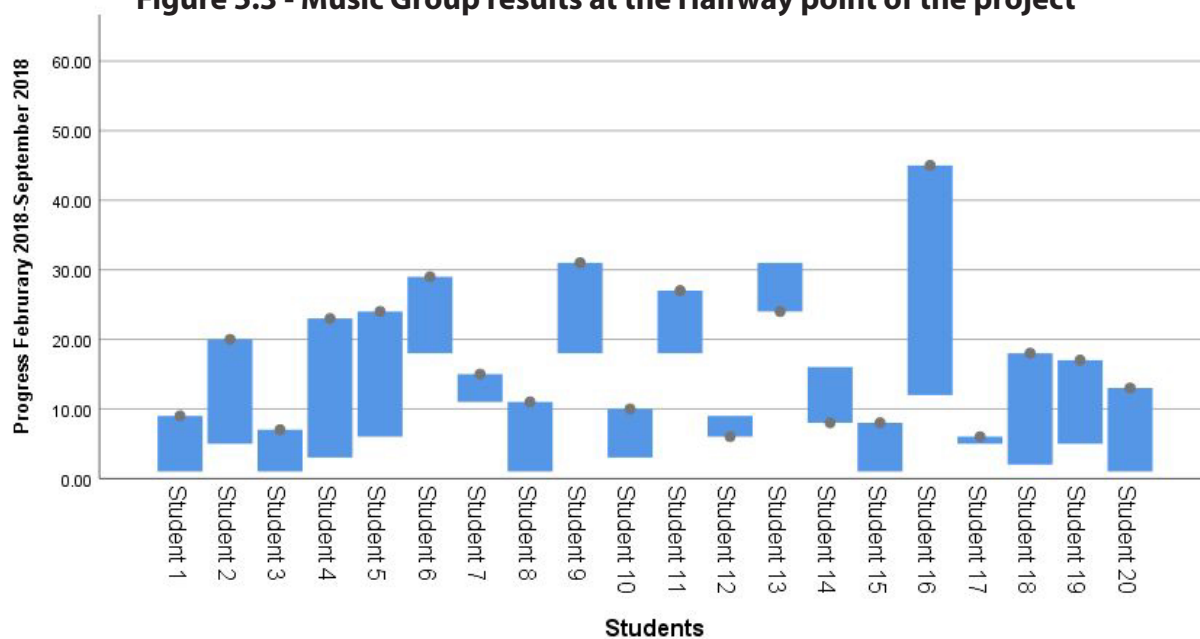


Figure 5.3 demonstrates the progress of the Music Group Students at the halfway point of the project, demonstrating that for many of the students, time was needed for the intervention to be fully effective.

PROBE TEST RESULTS

A RICHER PICTURE OF READING DIFFICULTIES

When the research team began the project we knew that we had a cohort of students with reading difficulties within the school. However, the research project put the spotlight on these reading difficulties and a picture began to emerge of the mechanism the students were struggling with. In running PROBE 2 testing the teacher administering the test observed that almost all students were able to read accurately (if not fluently). PROBE 2 levels can be failed through inaccurate reading or poor comprehension. Not a single student at the start of the project failed a PROBE 2 test based on their reading accuracy; they all failed reading levels through poor comprehension skills. This trend continued throughout the project, and at the end of the

project, only one student failed a PROBE test through poor reading accuracy.

It was observed in all three rounds of testing, that the default strategy for students when they could not read a word was to skip the word, or say “I don’t know that word”. In the comprehension strand of PROBE 2 students had most difficulty in gaining inference from the text. In fact all ‘failed tests’ involved students incorrectly answering inference questions. Closely followed by difficulty with inference, was difficulty with reorganisation and evaluating the text. Interestingly, 60 percent of students had difficulty in decoding the ‘vocabulary words’ in PROBE 2, yet when asked verbally to describe what they meant, students could invariably give a correct answer.

Rate of reading in PROBE 2 also impacted the outcomes of the comprehension questions. When students fell below 80 words per minute, even if their reading demonstrated accurate decoding, their comprehension was significantly compromised. PROBE 2 gives results in reading age. To generate results the researchers compared

the difference in reading age and the candidate's actual age. At the beginning of the project the Music Group students' reading age was on average 3.6 years below their actual age. By the end of the project, this deficit had been reduced to an average of 2.1 years below actual age, demonstrating a gain in reading age of approximately a year and a half.

Figure 5.4 - PROBE 2 Pre Test Results

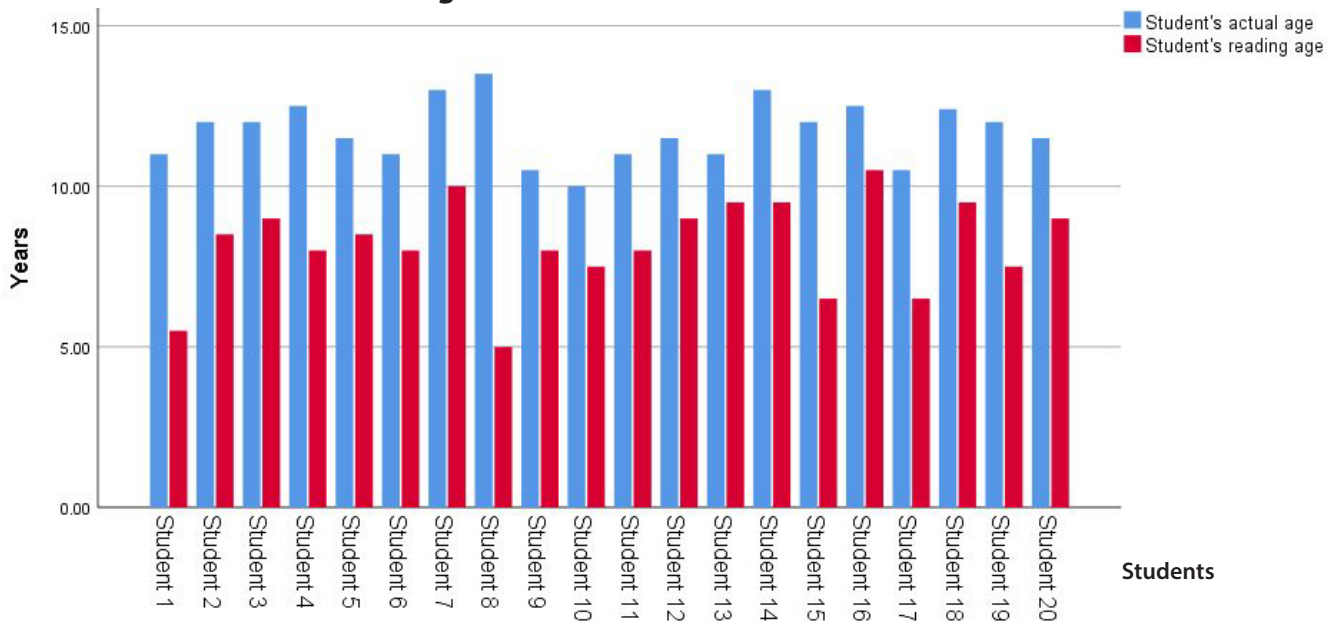
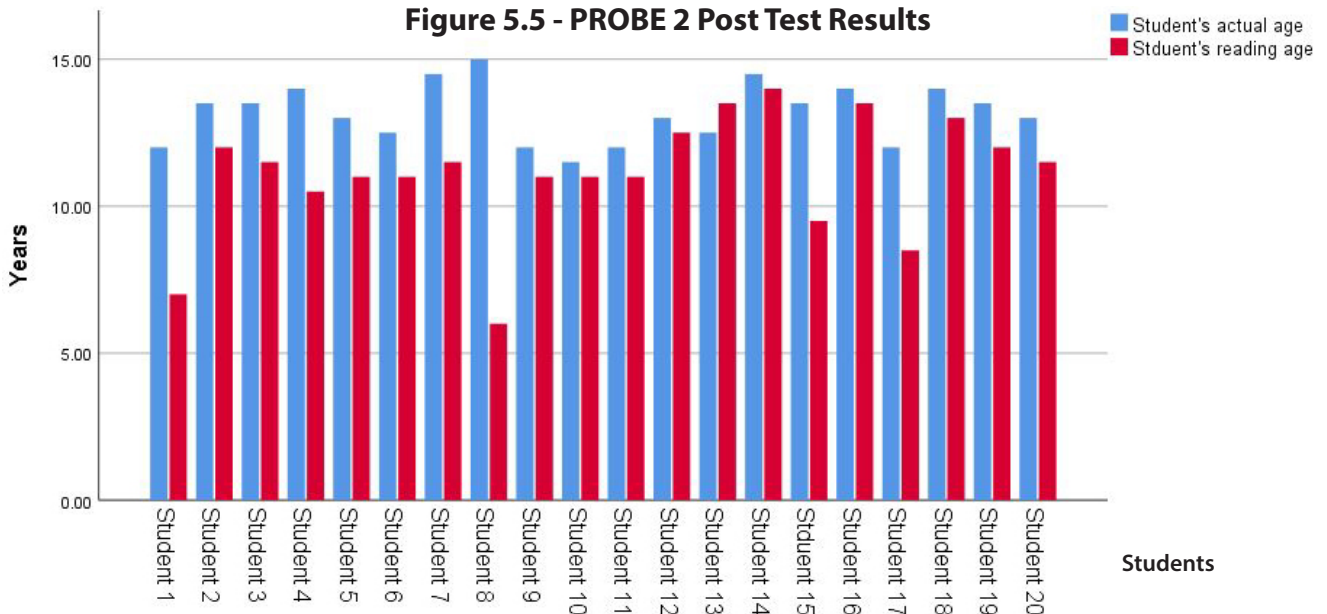


Figure 5.5 - PROBE 2 Post Test Results



Figures 5.4 and 5.5 gives a demonstration of the improvement of students' reading. The blue bar represents the students age at the time of testing, whilst the red bar represents their reading age. It can be clearly seen that most Music Group students showed significant catch up to their chronological age over the course of the project.

PROBE 2 results indicated an effect size of $d = .67$, indicating a moderate to large effect size.

Effect size was calculated using Cohen's D:

$$d = \frac{|M_1 - M_2|}{S_{pooled}}$$

A moderate to large effect was seen when the difference between actual age and reading age was compared. The pre intervention PROBE 2 results ($N = 20$, $M = 2.13$, $SD = 1.76$) were compared to the post intervention PROBE 2 results ($N = 20$, $M = 3.58$, $SD = 2.37$). Unadjusted means were used in calculations, $d = .67$ indicating a moderate to large effect size.



STUDENT INTERVIEWS

There is an inherent complexity to using music tuition as an intervention for students who have low reading skills. Thus students were interviewed. The data was coded using Nvivo software, and a thematic analysis approach was used. The initial goal in conducting interviews was to gauge student's engagement in the Music Project as we felt that this would mediate progress. However, several important themes emerged throughout the data giving particular insight into the student's reading difficulties and reasons as to the success of the project.

THEMES ASSOCIATED WITH READING DIFFICULTIES

Reading difficulties were a significant theme in almost all of the student interviews and within this theme there was a subset of vocabulary. Over half the students in the Music Project struggled with words they didn't understand or could not identify. Because they struggle with vocabulary, they consequently have difficulties extracting meaning from text. One student described their reading difficulties in the following way:

“**Probably sometimes feel like the easiest thing to understand ... is when ... I can see, like, the picture in my head (sic). But when it's just like a few words I don't understand or I can't picture it ... I just can't understand it.**”

Auditory processing also emerged as a difficulty students faced. Approximately half of the students in the project also described the difficulties they had putting sound to vocabulary. They may understand the meaning of a word, but they have no idea of how to pronounce the word when reading aloud.

“**Words that I can't really say properly in books, when I say it out loud, but if I'm reading them in my mind then I can understand them ...**”

The final area relating to vocabulary was the almost universal struggle students had with decoding. When asked to describe what they found difficult in reading, students invariably raised issues of difficulty with decoding. Further, students had few strategies to deal with decoding beyond guessing, skipping the word or asking a teacher.

STUDENT 3

INTERVIEWER: What do you find hard about reading?

STUDENT: *Getting stuck on a word and you just can't spell it out ... That's the thing I really hate.*

INTERVIEWER: What do you do when that happens?

STUDENT: *I just look at it and just try and figure it out. But if like ... my friends are next to me, they'll say it for me. That's helpful.*

STUDENT 13

If I still haven't figured it out I'd either like skip that word and read onwards with the sentence and I'm free and I try to figure it out, and think what this would be ... or if I had more a lot more words like that I'd probably just think 'Oh this book might be a little bit too hard for me right now' ... so I might put that one back and read it later on in the year.

STUDENT 20

INTERVIEWER: What do you find hard about reading?

STUDENT: *Probably like the really, really long words.*

INTERVIEWER: What do you do when you come across some long words that you don't know?

STUDENT: *I just wait 'til the teacher said it out loud. Then I just keep playing it in my head.*

It needs to be acknowledged that there is a resonance between the current literature and the reading experience of the students in the project. Essentially they are describing a difficulty in auditory and phonological processing, whether if be through attempting to decode words or pronounce words.

STUDENTS' VIEW OF THEMSELVES IN THE CLASSROOM

Generally students were aware of their academic struggles. Even students at the upper end of the music cohort described significant struggles with keeping up with classwork. Within this area a common theme was avoiding asking for help. Most students had a preference for asking friends, or waiting for the answer to 'reveal' itself.

STUDENT 5

- INTERVIEWER:** What do you find difficult at school?
STUDENT: *um ... When I don't understand questions or something like that.*
INTERVIEWER: What do you do when that happens?
STUDENT: *I'm normally ask family; I don't ask the teacher a lot of the time.*
-

STUDENT 4

- INTERVIEWER:** That's good. What's difficult at school?
STUDENT: *Uh ... Maybe not getting something but everyone else does ...*
INTERVIEWER: What do you do if you've missed something that everyone else seems to have gotten?
STUDENT: *Just try and stay listening just in case they mention how to do it ... ask the teacher.*

These students expressed themes of anxiety concerning school work and either not finishing or not doing well, putting them at risk of negative motivation and engagement.

STUDENT 3

- INTERVIEWER:** Yeah. So how does that go when you've got to read out loud?
STUDENT: *It goes okay ... it goes all right sometimes ... but it's a bit hard because ... I'm wanting to know when you're reading next ... because we go along rows and stuff.*
INTERVIEWER: Yeah.
STUDENT: *Yeah. I'm not as fluent as everybody else.*

The experience described by the students, highlights the difficulties they face at school. School is a place where their learning difficulties present them with constant challenges. They are high risk of both negative motivation and engagement. Which was an aspect of their profile which informed the teaching within the Music Project intervention.

MUSIC TUITION

All students reported that they enjoyed music tuition; interestingly almost all students connected their enjoyment of music to the feelings of achievement it created. Achievement was one of the most prevalent themes emerging from the interview data. Themes concerning the sense of success that students experienced as a result of learning a musical instrument was one of the most prevalent themes in the data.

STUDENT 10

INTERVIEWER: How's music going?

STUDENT: *Um ... Music is going good, becuae I've learnt quite a lot of songs and I'm progressing better every day.*

Closely following achievement were themes looking at the social aspect of music learning, which occupied an important place in the minds of all most all of the Music Group members. The idea that the project was across year groups, introducing them to new people and giving them an opportunity to develop a group identity contributed to students' enjoyment of the project.

STUDENT 5

INTERVIEWER: What are you enjoying about music?

STUDENT: *Just meeting people and learning new stuff.*

Another student, when questioned on what they enjoyed about learning music:

STUDENT 7

INTERVIEWER: What are you enjoying about music?

STUDENT: *Uh ... the other people.*

INTERVIEWER: What is it you enjoy about the other people?

STUDENT: *That there are people out there that needs help with reading and ah ... and I'm not the only one.*

The themes of both achievement and the social aspect of music making also fed into the motivational profile of students within the project. With achievement linking to the learning focus aspect and social aspects linking to the valuing dimension of positive motivation.

There are always assumptions that to progress in music tuition students need to practice. Almost uniformly across the group, these students did not practice regularly. Their answers ranged from not at all to about 20 minutes per week. Only one student in the Music Group reported daily practice.

Repertoire was extremely important in both the engagement of students, and the development of their group identity. The favourite ensemble pieces were uniform across the group, and were the second most frequently mentioned point of enjoyment of ensemble, after the factor of being with friends. At the later stages of the project, when students had reached a certain level of proficiency they were allowed to choose their own repertoire (from a range of options), and almost all students mentioned (unprompted) this repertoire

as something that they particularly enjoyed. The choice of repertoire had a strong relationship with self efficacy themes.

It needs to be noted that although every student interviewed (except one) reported being highly engaged in the project, the interviews indicated that they were not highly engaged in practice. In fact, when asked how their practice was going, most students thought that they were being questioned about their group music lessons and ensemble lessons. This was consistent across both interview periods, and the researchers concluded most rehearsal on instruments occurred in the lessons delivered within school time. The most cited reason for lack of practice at home, was students feeling overwhelmed with completing assignments and assessment tasks, leaving little room for anything else.

KINESTHETIC ASPECTS OF LEARNING MUSIC

Students had a strong connection between their fingers and the relationship to the symbol on the page. When the researchers began the research project there was an assumption that there would be a strong 'sight to sound' connection, however the results suggest that 'sight to action' is an equally important connection. Students reported that the act of finding the notes on the instrument, helped them to both learn how to play the notes and how to read the notes.

STUDENT 13

INTERVIEWER: How do you read the music?

STUDENT: *Um ... just look at it and then play it, I guess.*

INTERVIEWER: Ok, so how do you know what to play?

STUDENT: *I just have like ... a little dot and dots filled in, and you just put your fingers there.*

STUDENT 4

INTERVIEWER: So when you learn to read notes how did you go about learning to read the notes?

STUDENT: *I went good. I always got help with it or looked at it and then looked at all the piece ... like that's an A ...*

INTERVIEWER: Yeah. So what do you think sped you up?

STUDENT: *I don't know ... I like ... It was just like pressing buttons like quickly my fingers were reacting with my brain a lot ... I don't know ... It's hard to explain, but my fingers knew where the note was.*

MUSIC AND READING

All students involved in the Music Project, with one exception, reported that they felt that learning music helped with their reading. The validity of this data is not totally reliable, as the students knew that they were learning musical instruments in order to help them with difficulties in reading. At the same time, all of the students were very conscious of their reading difficulties. Dr Anita Collins had also visited the school as part of her mentoring role, and had spoken to students regarding the benefits that music tuition can have for students with reading difficulties. Thus it needs to be acknowledged that students' responses in this area of the project are possibly biased through involvement in the project itself.

Within the broad theme of the impact of music tuition upon reading, several sub-themes emerged. The most common response, regardless of the sub-theme, was that students felt that music tuition helped their reading, however they could not pinpoint the precise mechanism involved; they were merely confident that it was helping things to change. Beyond that, some of the students attributed the improvement in reading to the extra work that their brains had to do in order to play music. It was like high level multi-tasking.

STUDENT 13

INTERVIEWER: What impact do you feel learning music has had on your reading?

STUDENT: *I think doing two things at once. Because ... when you read the music it's like reading words and then when you blow it it's like thinking what the words mean (SIC).*

STUDENT 19

INTERVIEWER: What impact do you feel learning music has had on your reading?

STUDENT: *Um, having to use my brain a bit more as in reading notes, and then having to do normal reading is easier.*

Some of the students made the connection between learning the note names, playing songs and sounding out words. This was a particularly interesting finding, as this was an area that had not been discussed with students. At no stage in the project did the research team discuss with students the auditory processing aspects of reading difficulties. Yet it was an area of improvement that they were able to highlight without prompting.

STUDENT 11

INTERVIEWER: So how do you think that time learning how to read the notes and doing that has helped with the reading?

STUDENT: *Maybe I'm reading the notes might have just ... I don't know ... maybe helped me with um ... my sounding out of words and figuring ways that I could like ... figure out the words and maybe that may have helped a little bit more.*

Some of the students also identified a link between the fluency of playing music and fluency in reading. They recognised the fluency which is intrinsic to music performance flowing over into their reading skills. Along with this, the confidence that also came with reading music fluently also raised student's feeling of confidence when it came to reading.

STUDENT 14

INTERVIEWER: What do you think it is about learning music that makes reading easier?

STUDENT: *I think 'cause reading music is a bit easier than reading, but it's still like, it's the same kind of ...*

INTERVIEWER: What's easier about reading music than reading a book?

STUDENT: *You just got the notes, and then like ... and you're like ... fluently reading like ... saying ... like ... words you're like ... saying letters.*

INTERVIEWER: What impact do you think learning music has had on your reading?

- STUDENT:** *I feel like it's kind of um ... I used to have reading problems ... I'd read the same line again. But I feel like kind of reading music is just like the flow of the song has kind of helped.*
- INTERVIEWER:** **When you say the flow of the songs helps ...?**
- STUDENT:** *When I'm playing an instrument. Yeah it kind of flows like the sound coming out and it just um ... just flows I guess.*
- INTERVIEWER:** **So how does that crossover into reading ... because if there's not a song going on how does that ...**
- STUDENT:** *Just 'cause in music ... I don't really read the same line again just because there's a sound coming out ... and um ... so I kind of keep going.*

Paired with the feelings of confidence that came with learning a musical instrument, was the acknowledgement that learning a musical instrument developed feelings of persistence and discipline in the students. They felt that this overflowed into the discipline and application they then brought to reading.

STUDENT 14

- INTERVIEWER:** **Then what impact do you think learning music had on your reading?**
- STUDENT:** *Had a bit of an impact. Like I am learning notes ... right ... and the notes ... like, I've learnt to keep on reading ... instead of giving up ... if it sucks and chuck it ... like if it sucks and I was halfway through the book now I would probably keep on reading ... 'cause I just like, want to keep on reading because ...Just to see what happens (SIC).*
- INTERVIEWER:** **So how do you think music has helped you to be more persistent in reading books?**
- STUDENT:** *like ... Well when I'm persistent ... Well if I'm like playing my instrument and I'm learning new notes ... like if I ... if I am able to read the notes quicker, and I would be able to be better at reading quicker.*
- INTERVIEWER:** **How have you found learning to read notes?**
- STUDENT:** *um ... Easy*
- INTERVIEWER:** **Easy? What's been easy about learning to read notes do you think?**
- STUDENT:** *Because when I see a note I think oh that's that note, is what I'm saying. I used to be able to be like all E, um, what's E. But now because I've got the flow of it I can now easily ... play so ...*

Students also reported that music helped them to be more attentive; that they found the repetition associated with learning a musical instrument was also helpful. In fact, almost all students reported repetition as a learning strategy when it came to learning a musical instrument.

“ **When I did like a muck up or something ... I kind of felt ... I got to do this again until I get it right ... I want to prove to them that I can do it.”**

Figure 5.6 - Word cloud capturing students' feelings about music tuition.



TEACHER SURVEYS

STUDENT CLASS PROFILES

Teachers were interviewed for their perceptions of the Music Project students' learning profile. The real point of interest in this area was the understanding of student's learning difficulties. Whilst all teachers recognised that the students had learning difficulties, few of them made connections between their profile and their presentation. For example, one teacher described a Year 7 student's learning in the following way:

“The learning difficulties are more complex than just reading. XXXX is often not proactive in completing or starting work. He is at times enthusiastic and engaged and at times withdrawn and reluctant.”

The same teacher then followed up by describing the student's biggest weakness as a learner was reading and writing. Most teachers described most students as disorganised and distracted in class. There was an interesting combination of describing students as learners who easily tune out in class, yet teachers also attributed persistence and a desire to present their best work in the classroom as a defining characteristic.

Figure 5.7 - Word cloud based on teachers' views of student profiles in the classroom.



TEACHER'S STRATEGIES FOR TEACHING READING

The surveying of teachers regarding their strategies for teaching students with reading difficulties revealed that there are a wide variety of strategies and approaches being used to address the learning difficulties these students face. Some of the teachers focused upon strategies that helped to make content accessible:

“**Modifying tasks to take the pressure off the decoding of words - bypassing this to get to reading for understanding. Audiobooks are my favorite - kids to listen to the book and follow along while reading.”**

(High school teacher of Music Project students)

Whilst others, particularly primary teachers, had very definite strategies for teaching reading skills:

“**Students generally come to this Stage reading at level 30 which is independent. For students who struggle with reading - the most effective strategy is to identify what part of reading is ineffective. Then target this specific area of learning. I utilise Teacher aide support for small group or one-on-one sessions. Plus teacher in class support.”**

(Stage 3 Teacher)

“**Concentrating on phonemic awareness.”**

(Stage 3 Teacher)

“**Repetition, specific teaching of sight words. Being exposed to a variety of genres. Being read to and having books shared with them and discussed.”**

(Stage 3 Teacher)

The primary teachers had strong strategies generally, although even here there was inconsistency. Some teachers have a strong reliance upon traditional strategies (phonological skills, connecting of sound to symbol), whilst other teachers had strategies that reflected a more whole language approach (predicting text, sight words, cue words). What was uniformly evident across teacher surveys was a recognition that we can do more for some students.

OBSERVATIONS

Throughout the Music Project observations were recorded of student's small group lessons as well as their behaviour in ensembles. It quickly became apparent that there were a number of aspects to the students in the project that the researchers did not anticipate, and that the literature review did not point to.

The most significant area was the sensory profile of the students. Every student in the project who learnt saxophone or flute required sensory cues to remember where to put their fingers for approximately the first month of music tuition (this was at the time, 12 students from the entire cohort). This happened through sticking 'sports tape' on keys that were not the standard way to hold the instrument. The students encountered the different texture and realised their hand was in the wrong place and made adjustments accordingly. In over 25 years of instrumental teaching the lead researcher had never encountered this difficulty before.

We began the research project aware that a number of students in the cohort had diagnosed difficulties in auditory perception, however the Music Project highlighted exactly how this played out for the students. The teaching method used for the project which was based in Orff-Schulwerk methodology, and was reliant on singing before playing instruments. It quickly became apparent that of the 20 children involved in the project, 16 had great difficulty matching pitch when singing songs. Further, when students moved to playing songs on instruments, a number of students

exhibited a complete lack of awareness as to when their pitch was incorrect.

This was most evident for the students playing brass instruments where students have to develop a strong internal understanding of pitch. The teacher could be playing a note and ask students to match it, and they could be as much as five notes away from the correct note and be completely unaware that there was a problem. As the project progressed this problem became less prevalent. By the end of the project all students could sing in tune and they could match the pitch being demonstrated by the teacher, as well as clearly identifying when they were playing the wrong notes.

Observation notes taken when the interviews were completed also highlighted the different speech patterns and understanding of syntax that some of the students had. Throughout the interviews a number of students exhibited unusual patterns of speech and grammar evident in the examples previously quoted.

Executive function also featured in the observations. This was quite a deliberate decision knowing that executive function impacted upon reading. Almost all students involved in the Music Project exhibited poor executive skills. This manifested in a number of ways. They had great difficulty in remembering to come to lessons, to bring their instruments to school and to bring their music book to school. To combat this their timetable was sent to students, parents and

relevant classroom teachers at the beginning of each week. Students' timetable were also recorded in the schools student management system, with the result that class rolls would reflect that students were meant to be at a lesson, thus prompting a reminder from the teacher. This continued over the course of the project.

Within music lessons, there was evidence of organisational strategies in how students approached the memorisation of new music notes, and the strategies they put into place in order to learn music ... (for example, one student would write in the notes names under the notation for every song in the music book, and developed their own shorthand notation to assist with their reading) ... however it was difficult to attribute this to improved executive function. Thus, based on the observations available it was difficult to conclude that students' executive function had been improved.



Visit to Feversham Primary Academy

As part of the project, a visit was made to the Feversham Primary Academy in Bradford, UK. This school was chosen as they had particular success in improving reading results through using music as an intervention. Debra Batley spent seven days following James Rotherham, the head of music at the school, at various conferences and four days at the school. As part of this visit Debra also met with Dr Katie Overy, a leading researcher in the use of music to remediate dyslexia.

The visit was particularly informative. In 2013 the school was in 'special measures' and in the bottom 10% of schools; within six years the school had moved to the top 10% of schools in England, as measured in improvement of students in maths and reading. In 2011 the school was 3.2% below the national average for reading; they are now 7.2% above. The school includes a nursery school, and 99% of the school population speak English as a second language. The school principal Naveed Indrees attributes the improvement in the school's academic outcomes to the music program,

explaining that a conscious decision was taken to supplement learning with creative approaches in order to improve student engagement.

The school's music program is Kodaly based and is entirely vocal. Feversham's incumbent music teacher feels that it is the Kodaly method in particular that is responsible for the success of the music program. The observation of the research was that the learning cycle at Feversham was far more complicated, and a number of factors have led to the success and improvement of students, beyond the Kodaly method (worthy a method as it is). It is the researcher's opinion that the following factors have contributed to Feversham's success:

- Exemplary music teaching
- 'Buy in' from teachers
- Teacher mentoring structures
- A generally creative approach within the school

Any method of teaching music can be done well or poorly. The application of the Kodaly method at Feversham could be best described as ‘Kodaly Plus’. On observation, it encouraged embodiment of musical ideas, or in other words it had a ‘whole body approach’. Every key teaching point in the class was reinforced by some kind of kinesthetic movement. There was also a strong sight to sound connection being constantly reinforced (which is typical of Kodaly). Further, this program was presented consistently throughout the week. Every class had two fifteen minute lessons and one half hour lesson. This moved music from being merely an add on, release from face to face (RFF) lesson, but was rather an integral part of school routines. The regular class teachers also came to the music lessons, and were active participants, thus modelling to students that music was an acceptable activity.

There were structures within the school that also promoted the success of the program. The only teacher without a full teaching load was the Principal. Due to the predominantly Muslim population of the school *all* RFF was taken as a half day on Fridays when students leave just before noon in order to attend *Jumu'ah*. This meant that the structures within the school facilitated the classroom teachers attending music lessons as their RFF was still protected. Further there was much scope for collaboration between staff, as their preparation and planning time was shared. It was also observed that the regular classroom teachers incorporated the content of the music lessons into their regular classroom lessons. Having teachers attend all of the music lessons facilitated a musical mentoring relationship between James Rotherham and the wider teaching staff.

Figure 6.1 - Feversham Academy Music in Action

This snapshot of the Feversham classroom is notable due the involvement of the general Year 5 classroom teacher. Standing is James Rotherham, in the background is the Year 5 teacher with a class of Year 5 students. He is fully involved in the activity (singing a song using curwen hand signs).



As mentioned earlier, principal Naveed Indrees ascribes the school's improvement to the music program. In fact he is quoted in the press as saying the only thing that changed was the implementation of a music program, taught by a specialist. From the point of view of Debra Batley the school had a holistic program that would intrinsically promote greater engagement and learning improvements. The school left a general impression that critical and creative thinking was a prized skill. In conversation with Indrees, it became clear that he valued a creative approach to teaching which fostered student engagement. In fact, the week of the visit to the school immediately followed an audit carried out by the Academies, where the need to consistently incorporate a more creative approach to teaching was highlighted.

Science, Technology, Engineering, Arts and Mathematics (STEAM), has gained critical momentum in the English Education System. In the 10 days Debra Batley was in the UK she attended four professional learning events with a STEAM focus. It is her observation that the Feversham program provided an almost exemplary implementation of the STEAM philosophy. The research is not suggesting that music has not made a difference at Feversham, but rather the exemplary teaching throughout the school, and the strong leadership of Naveed Indrees has equally contributed to the improvement in learning outcomes for the students. Indrees' arrival at the Academy also correlates with the steady improvement in academic standards. The picture at Feversham Academy is also consistent with the Australian situation, where the impact of school leadership upon is one of the biggest factors in the success of arts based programs (Lorenza, 2018).

For a research to practice perspective, the biggest 'takeaways' were:

- 1. Success of interventions such as music rely upon the strong leadership of executive and subsequent 'buy in' of the entire teaching faculty.**
- 2. Strong allround teaching is needed to see academic improvements. If the Feversham Academy showed poor classroom practice across the board, would the strong academic improvements have been seen? In other words, music itself is not enough. Music plus exemplary classroom teaching is potent.**
- 3. A program based on singing with a strong sight to sound connection could be as successful as an instrumental program.**

On return to Australia, the research team considered the implementation of a singing based curriculum with Year 5. However in the end the time line proved to be too short for an adequate implementation; this remains an idea for implementation for the future.

Discussion

The research aimed to investigate the impact of direct musical instruction upon students with learning difficulties associated with reading. In particular, it investigated whether specific small group in musical instruments, combined with ensemble instruction impacted specifically upon reading comprehension of middle school aged students who had learning difficulties associated with reading. The discussion is framed around the aims and research question of the project.

RESEARCH QUESTION

Does specific small group instruction (25 minutes per week), combined with one large ensemble lesson (45 minutes) specifically impact reading comprehension of students of middle school age (Years 5-8), who have learning difficulties associated with reading, in a NSW school?

It needs to be stated at the outset that the reasons for reading failure are complex, as is the life of a middle school student with learning difficulties. The study cannot really prove causality as there are too many 'other factors' at play for students. For instance, some students relate to particular teachers more positively than others. Middle school is a time of transitions within the school, and some students handle these transitions better than others. Students home life also impacted upon the student's level of success. Thus the research team can say that the effects sizes of both PROBE 2 and PAT-RC support the idea that the Music Project made a significant difference in the reading ability of the students. Certainly, the Music Group students had much stronger results in reading than the Control Group, particularly when viewed over the eighteen month period of the project. These results are consistent with the findings of Moreno, Friesen, and Bialystok (2011), Sala and Gobet (2017) as well as Tierney and Kraus (2013). Furthermore, that these results were achieved with adolescent and preadolescent children is also consistent with Tierney, Krizman and Kraus' (2015) findings that music tuition can improve the auditory perception of adolescents.

Using ACER's normative descriptions of student achievement, the Music Group students mean percentile data moved from having an average percentile score of being 'low' ($M = 8.57$) to having an average percentile score of being 'average' ($M = 27.67$). In fact at the beginning of the project, there were eight students in the Music Group who would have been classified as 'very low'; all of these students moved to at least 'below average' with five of these students moving into the 'average' percentile range. The Control Group painted a different picture; their mean pretest percentile score ($M = 11.24$), placed them just

inside the 'below average' description. The post test mean percentile score ($M = 13.92$) had them remaining in the 'below average' description. Of the five students in the Control Group who began the project in the 'very low' range, only two students demonstrated significant improvement (Figure 5.2).

Even with these strong results, it needs to be acknowledged that an average reading comprehension percentile score of 27.67 still indicates the need for improvement. Whilst significant improvement has been made, the students reading problems have not yet been solved and they will still need support and interventions to become fully independent learners.

Similarly, the PROBE 2 test results support this data. At the beginning of the project the mean difference between reading age and chronological age was 3.6 years. By the end of the project it was 2.1 years below actual age demonstrating that students had begun to improve in their reading comprehension skills. However, the mean difference between reading age and chronological age indicates that remediation is still required. Whilst the students are making progress there is still substantial work to be done. In fact, a strong case could be made for continuing the project with these students in order to measure if they could catch up, and to find out exactly how long it would take for them to catch up.

WHY THE PROJECT WAS SUCCESSFUL

A REAL WORLD APPLICATION OF THE OPERA HYPOTHESIS

It was beyond the scope of the project to examine the neurological processes associated with music and reading. However it is not unreasonable to make a connection between this literature and the idea that improved reading standards seen in the project are due to the suggested neurological effects of music tuition (Patel 2012a, 2012b, 2013). The interview data also supported this idea. The students clearly saw overlap between the skills they acquired through learning a musical instrument and improvement in reading. The phenomena they described - such as music giving them an awareness of fluency in reading and speech, also highlighted the overlap between these skills. The obvious enjoyment that children had in music shows the emotional aspect of Patel's OPERA hypothesis (2012a). In fact, it is hard to imagine this project being successful without students finding a strong sense of enjoyment in learning and performing music. Continuing with Patel's hypothesis, the experiences of students in ensembles, where they found it challenging to play music in time with others, highlighted how they were led to a learning activity driven by precision. Both learning music and playing in ensembles also led to regular activities involving repetition and attention. The student's emotional connection to the activity led to them being willing to practice with focused attention and continue with enough repetitions to enable fluent performance.

The research team would suggest that they saw Patel's OPERA hypothesis (2011) at work, and this contributed to the success of the project. They would recommend that further studies looking at remediating reading should incorporate these aspects; music tuition was a highly effective vehicle for delivery of an intervention to support struggling readers. That students spent over an hour a week in music tuition also contributed to the success of the project. Given the low practice levels away from designated time in the Music Project, the researchers would recommend that using music as an intervention, relies on multiple short music sessions across the school week. This would also explain the success experienced at Feversham Primary Academy, which being a Kodaly singing based program, actually had no expectation that music would happen away from the classroom in any significant way.

STUDENT MOTIVATION AND ACHIEVEMENT

The motivational profile of students was also a key factor in the improved reading standards of the Music Group. The research team believe that the Music Project possibly had a positive impact upon students' school experience, which in turn fostered positive motivation. The students involved in the project were all accustomed to experiencing failure in the classroom. Students knew when they were behind their peers, and the interviews indicated that they were acutely aware of their academic struggles. When asked about things that they didn't like at school, students

invariably replied with answers such as not understanding lesson content, reading, writing, getting things wrong in the classroom. The Music Project provided many of the students with an academic 'safe haven'. They have experienced success and many of the students described music as an 'easy' activity. It is the research team's view that they were experiencing a moment of mastery experience which was consistent with Martin's 2013 motivation framework. Supporting this idea was the strong theme of achievement which ran through the interviews.

The implication is that for a musical intervention to be successful it needs to be extremely well pitched to students. Teachers need to be mindful of Vygotsky's zone of proximal development (Vygotsky 1978). The research team feel that when using music tuition as an intervention, students need to experience significant success in order to remain engaged, yet at the same time have enough challenge in activities to remain motivated in their learning. This places a lot of responsibility back on the teacher: going too fast means students just have another experience of failure at school, and going too slowly means the activity will not be engaging enough. Perhaps one of the reasons it was so successful in creating a feeling of achievement was that students viewed it as a 'non-academic' activity. Their attitudes to practice suggested that music 'sat apart' from school work.

Allowing students to choose their own repertoire in the second year of the project was also important to the project's success. It provided students with a small measure of autonomy at the moment when their learning was beginning to plateau, which boosted their feelings of success. The fact that they then took this music out and performed it

publically served to reinforce these feelings for the students.

The social aspect of the project was also important for student motivation. Students loved the comradeship of both group lessons and the ensemble, suggesting that social networks can make an important contribution to the success of learning interventions. Whilst this seems an obvious conclusion, the research team feels that this aspect of school life for students experiencing learning difficulties can be overlooked. The Music Project allowed the students to participate in activities with other students who were having a similar experience of school life. It lessened their feelings of being 'the only ones'. At the initiation of the project the research team believed that playing in an ensemble would be important for teaching musical precision. What they discovered was that the unexpected benefits of being in an ensemble made it a crucial aspect of the project's success.

READING AS A KINESTHETIC ACTIVITY

The literature clearly indicates some sensory difficulties being involved in students' with reading difficulties; after all, auditory processing and phonological processing are reliant on the auditory sensory system. The research of Tierney and Krauss (2013, 2014) and Tallal (2012) also supports this idea. The idea of connecting sound to symbol relies on combining the senses of auditory processing and sight. Given the large number of students with initial tactile difficulties in learning their instruments (who needed physical prompts to remember where to put their fingers), the research team is now hypothesising that there is a general sensory deficit for students with reading difficulties. Furthermore, it is not unreasonable to conclude that the Music Project possibly assisted in addressing this.

Supporting this is the idea that music was a highly kinesthetic process for students. When they described how they learnt to read music, they described what their fingers did. This resonates with the work of Stavely (2011, 2014) who suggests that movement and gesture is a precursor to language. It stands to reason that this could be a contributing mechanism, and would warrant further investigation. That the Music Project was implemented using a teaching style reliant on gesture and movement is possibly significant. If more global sensory deficits are a factor in reading difficulties, was the teaching style particularly effective for students? Would this musical intervention have been as successful if it had not had the game based, aural and movement component to it?

Connected to this first hypothesis is a second emerging hypothesis: the issue of whether the combination of movement, sound and symbol were the potent ingredients in the intervention. If this was the case, it could be that rather than a musical intervention, a reading intervention which incorporated movement with sound and symbol could be equally as effective for the remediation of reading difficulties. It is certainly an area which warrants further investigation.

AUDITORY PROCESSING AND MUSIC

The student's description of their reading difficulties combined with observations of the music lessons confirm that poor auditory processing has a role to play in the poor reading skills initially displayed by the Music Group. Signs of improvement in auditory processing were noticed throughout the project. Particularly noticeable were the improvements in pitch matching, singing in tune and ensemble awareness. At the beginning of the project students in ensemble lessons had great

difficulty playing in time; however, by the end, most students demonstrated an awareness of when they were out of time with their peers.

The research team also wonder whether the difficulties the Music Group students experienced with decoding words are a reflection of poor phonological processing skills. This is also consistent with the research of Bhat et al, (2003) Carlisle et al (2016), Smith et al (2004), Anthony and Francis (2016) and Ashmore et al (2003). That the students had no decoding strategies, beyond waiting for someone else to help, also pointed towards difficulties with phonological awareness.

By the end of the project students were still reporting difficulties with decoding. Although throughout the entire cohort there had been a significant improvement in test results. The teaching observation that the rate of reading had improved, also pointed to phonological processing being strengthened over the course of the project. There is now substantial research literature suggesting that phonological awareness could be improved through music tuition (Anvari et al 2002; Forgeard et al., 2008; Kempert et al., 2016; Moritz et al., 2013; Tierney & Kraus 2014). The research team would argue that knowing the necessity of phonological awareness for fluent reading, combined with the research looking at the connection between music instruction and phonological awareness, it is possible that improved test results were partially a result of improved phonological awareness on the part of students in the Music Group.

SPEECH PATTERNS AND MUSIC

The research suggests that there is a strong interaction between understanding the patterns of speech and learning to read (Leong & Goswami,

2014; Wise et al., 2007). We saw this in action at the beginning of the project when specialist academic mentor Dr Anita Collins was able to pick out poor readers from a line up of students, just through listening to their speech patterns. Empirically, the interviews with students also revealed that many of them (not all), had speech patterns that did not reflect an understanding of the syntax and natural rhythms of speech. Music Group students self-reported that music helped them to understand the flow of text. Some students even noticed that speaking is like music, which suggests that the effects reported in the literature, did actually take place for the Music Group students (Du & Zatorre, 2017; Patel, 2013, 2011; Schön, et al., 2004; Strait et al., 2011). Even so, at the last round of student interviews, some Music Group candidates were still exhibiting ‘interesting’ speech patterns themselves, which suggests that it may not be a cure all and that other remedial work may be necessary.

MUSIC PROJECT “BUY IN”

The project also needed significant ‘buy in’ from all stakeholders in order to be successful. The learning profile of students meant that many of them were disorganised when it came to lesson times and days. In fact, a number of students could not even tell the time, so giving them a lesson time was of little practical use. The project was dependent on the engagement of parents to support the organisation of students at home. Without their assistance, students would have never arrived at lessons with all of the necessary equipment. The ‘buy in’ of teaching staff was also essential for the success of the project. The way teachers spoke about the project to students, their support of students attending instrumental lessons and their constant encouragement of students were also essential for the success of the

project.

In particular, through discussions with the lead researcher, the teachers with significant engagement in the project were constantly adding their classroom observations to the observation notes, and keeping the project updated with the other reading interventions being used in the classroom. Their contribution highlighted the idea that reading remediation is multifaceted, and requires a team effort to enact successfully.

WHEN THE PROJECT DID NOT WORK FOR STUDENTS

The strong results in both PAT-RC and PROBE 2, make it easy to forget that this project was not effective for every student. One student showed negative progress throughout the project and several students withdrew from the project citing the pressure of schoolwork. A further 3 students were excluded from the data because their attendance rate fell below 50%. In fact one of these students attended only one lesson in 2019 (though was still technically in the project as far as they were concerned). All of the students who were excluded because of poor attendance actually attended a maximum of 15 music lessons out of a potential 45. They attended a maximum of 10 ensemble lessons out of 40; thus their attendance was closer to 25%. Obviously no matter how effective an intervention is for students, it can only be truly effective if students are in the room.

The observation of the lead researcher, is that with the exception of students who moved away, those who withdrew from the project had profiles of not really enjoying the experience. Although students were given autonomy in choosing their instrument, in almost every case there seemed to be a mis-match of instrument. This meant that students did not enjoy the early success of other students and quickly became discouraged; it was almost inevitable that they would withdraw. There was also a correlation between family support and students becoming discouraged. If a student's

home life is disrupted through family breakdown, and living between two houses, it becomes increasingly difficult to arrive at school with the basics, let alone an instrument and music book. Conversely, sometimes the parents were very keen and the students were not. This created an ethical dilemma; the researchers wondered sometimes whether threats of 'playstation withdrawal' and the like, were driving these students' involvement in the project. In the end, the students with very poor motivational profiles self-selected out of the project through actual withdrawal or attendance so poor that they could not have been regarded as having taken part in the project.

The students who were most at risk of withdrawal were also those who could be regarded as having 'profound' reading difficulties. All students who withdrew began the project at the 1st percentile or Stanine 1. The remaining students in the project who started in Stanine 1, took longer to demonstrate reading improvement when compared to the others in the Music Group. On the whole they also made musical progress more slowly. It is reasonable to conclude that one of the factors at play here would be that it took longer for them to experience mastery moments, and thus they did not gain enough positive moments to remain motivated. All of the students who withdrew, except one, were also the oldest students in the Music Group cohort, suggesting that there

is an optimal window for intervention and by age thirteen it is perhaps too late. However it does need to be acknowledged that the sample sizes we are dealing with are very small, particularly when dealing with the division of students amongst year groups, and a larger sample size would be needed to confirm this.

Student 14, as displayed in Figure 5.1 and 5.3, is particularly interesting. Their results went backwards, rather than forwards, throughout the

course of the project. However it is notable that there was a significant improvement from the mid test to the post test. Student 13 was also interesting: they had the highest reading percentile score at the beginning of the project and demonstrated the least improvement when it came to PAT reading, which contrasts with the idea that being below the 10th percentile interferes with reading progress. It would be reasonable to draw the conclusion that whilst a music based intervention is helpful for some students, it does not work for all.

HIGHLIGHTING AREAS FOR IMPROVEMENT

The reflections of the teachers, combined with grades issued on school reports indicate that there is room for improvement in reading instruction at Carinya Christian School, particularly for high school teachers. Secondary teachers pre-service degrees do not prepare them to be instructing for reading acquisition. It is a challenging concept for these teachers, and specialist teachers are particularly out of their comfort zone. With students in the classroom who have significant delays they need more specific tools and strategies for teaching these skills.

The survey data of teachers indicates that they do not have strong differentiation strategies for students who cannot read. There was a disconnect between the awareness that they demonstrated concerning their learning disabilities and their understanding of their learning profile. This too is an area for improvement. Students with learning

difficulties need to be assisted to access the curriculum outcomes at the appropriate standard, and to be fully involved in classroom activities in order to thrive. These students will disengage in the classroom if the content is asking them to do something that is beyond their abilities without appropriate adjustments. Paradoxically, some teachers commented upon the disruption of tier 3 interventions for student's learning. It is the opinion of the research team that these interventions are necessary to make curriculum accessible and avoid the growing Matthew Effects (Stanovich, 1986) being experienced by the student.



LIMITATIONS OF THE STUDY

The most obvious limitation of the study is that the sample size was small. Even the original sample size of the original Music Group (n=30) and Control Group (n=30) before loss of participants was relatively small. However, within one school it is almost impossible to achieve larger sample groups. In particular it would have been ideal to have enough samples across instruments to see if instrument choice made a difference to overall reading progress. However the instrument distribution is not even, and individual samples of instruments are small; for instance, there are only two flute players, two trumpet players and one baritone player included in the data. These numbers are too small to make statistically valid conclusions.

The study would have also been strengthened through having a third group doing a different activity. If this had taken place it may have been possible to more directly ascribe improvements specifically to the intervention. Alternatively a parallel study looking at a singing based music program could also be instructive as it would highlight whether it was musical instrument playing or sight to sound connections which are causing improvements.

As the project continued, it became clear that motivational theory impacted upon the progress of students. In fact it could be argued that this was the most decisive factor (outside of school relocation) in whether students continued in the

Music Project. The project would have been far stronger if students' initial and post motivation had been measured using a tool such as Martin's Motivation and Engagement Survey (Martin & Lifelong Achievement Group 2013). This would have given us more detailed information on those students who succeeded, as well as a quantitative measure of how music affected motivation, which in turn could possibly affect reading improvement.

One of the criticisms of research looking at using music to improve the neurological processes behind reading acquisition is that it is really making no startling claims (Young 2018). For example, it has been posited that auditory processing would be enhanced through musical activity because learning and playing music has a strong auditory component; if you spend time practicing violin your auditory processing skills naturally improve. The research team agrees that on face value, there is nothing particularly amazing about the fact that music will improve auditory processing if it is not viewed in the context of the considerable literature making the connection between auditory processing and reading (Kraus & White-Schwoch 2015; Neef et al 2017; Strait, et al 2015; Tallal, 1977; Tallal 1980a; Tierney & Kraus, 2014). Similarly, the many aspects of the top down aspect of reading acquisition and the subsequent theories examining connections with music tuition as a means of improvement need to be viewed in light of the wider research. The research team acknowledges that they are not

able to prove that the improved reading standards experienced by the Music Group are a direct result of improved 'top down' aspects, however they feel that it is possible that these aspects have contributed to the results.

As has already been alluded to, the students were aware that they were in the study in order to improve their reading. Some students were only identified as struggling readers when the school assessment results were 'put under the

microscope' when the Music Group and Control Groups were selected. This had the potential for teachers to give more focused attention to the reading progress of students, which potentially biased the results. Whilst it is difficult for students to bring bias to the quantitative data, their perceptions and understanding of the Music Project as explained to them by Dr Anita Collins and the lead researcher Debra Batley could have brought bias to the qualitative data.

IMPLICATIONS

There are a number of implications which can be drawn from the Music Project, the most obvious being that at a practical level supplementing strong reading instruction with musical activities may help students who struggle with reading. In fact it could even be argued that music instruction has benefits beyond simply developing a love and appreciation of music for all students and could possibly be beneficial in general classroom teaching.

A distinction needs to be made between musical activities and targeted music instruction. Primary school classrooms are often places of movement and singing. However in NSW primary schools, classroom music is often relegated to release from face to face teaching. Further there is significant research suggesting that general K-6 teachers lack confidence and self-efficacy when it comes to classroom music teaching. The research team would argue that a program of teaching music, where the focus is upon 'sound to symbol' (be it instrumental or singing

based) has wide benefits for children. However this would change how music is delivered in primary schools and would take teachers well past the NSW creative arts syllabus outcomes (a document that many teachers struggle with).

The research team has gained an interesting perspective on the possibilities of music tuition when it is movement based, involves singing and instrumental playing. We would suggest that the findings of the research project imply that schools would need to go beyond the basic syllabus requirements for music teaching in a primary setting. Given the implications from students practice patterns we suggest that music is possibly best delivered in shorter more regular sessions in the school week. Implementing a wider scale project in secondary settings could prove more challenging due to the specialised teaching within KLA's. It would be almost impossible for the suggested 'less, more often' framework for music teaching to be carried out in a secondary setting.

When it comes to students with specific reading difficulties, the implication of the research is that a tier 3 intervention, could be beneficial for these students. The research team is not for a moment suggesting that traditional reading instruction be abandoned, but rather it be supplemented with musical activities. We would encourage teachers looking at the remediation of reading to think outside of the box and incorporate music instruction into the curriculum.

We feel that these findings contribute to the current knowledge base in several ways. Firstly we feel that we have extended the current educational theories surrounding the impact that music can have upon literacy skills (Moreno et al., 2011; Moreno, Friesen, & Bialystok, 2011; Moreno et al., 2009; Bonacina, 2018; Brown., Martinez & Parsons, 2006; Gordon, Fehd & Mccandliss, 2015). We have done this through applying the theories looking at the relationship between music instruction and the neurological development of children, and see if it has impacted reading. Further, whilst the project has not looked specifically at the phonological processing of students, it has applied the theory behind these other studies (Anvari et al., 2002; Forgeard et al., 2008; Kempert et al., 2016; Moritz et al., 2013; Overy, 2003; Tierney & Kraus 2014) and it is not unreasonable to hypothesise that one of the reasons behind student's improved reading test results is improved phonological processing.

The project has also built upon the research surrounding auditory processing. Again whilst the research team did not specifically measure the auditory processing of students, they do not feel that it is unreasonable to conclude that the results of the project give a practical demonstration of the influence auditory processing can have on reading standards. It is known that auditory processing is

a necessary pre-reading skill (Neef et al., 2017; Tallal 1977; Tallal, 1980a; Tallal, 1980b; Tallal, 2012) and it is known that music tuition improves auditory processing (Habibi et al., 2016; Kraus & Chandrasekaran, 2010; Kraus & White-Schwoch 2015; Strait et al., 2015; Tierney & Kraus, 2014). We would suggest that the improved reading results seen in this project could be partially attributed to improved auditory processing as a result of sustained musical instruction. That our cohort was pre-adolescent and adolescent in age also supports the work of Tierney et a., (2015).

The Music Project also aligned with, and some cases extended the understanding of the interaction between music and language. In particular the qualitative data supported the connection between music and fluency which was hypothesised by R. Gordon et al. (2015). The self reports of music sounding like sentences also contextualised the theories of dealing with music and language in musicians (Marie et al., 2011; Schön et al., 2004) with a cohort of students who were new to music.

The emergent themes of the student interviews suggest that in the Music Project we saw a practical demonstration of the OPERA hypothesis (Patel, 2011, 2012b, 2013). Whilst this hypothesis is concerned with neural plasticity (which the project team cannot prove) the improved reading test results, combined with the content of student interviews indicate that perhaps changes occurred that are indicative of neural plasticity. It is possible that for many of the Music Project students, new neural pathways (Habib, 2016) were formed or began to form.

In general, it is the feel of the research team, that this project has added to the literature. It has

applied the theories behind connections between music and reading and contextualised this in a project that looks specifically at reading comprehension skills with adolescent and preadolescent children. We feel our results support the literature through showing tangible evidence that music can improve reading comprehension.

FUTURE RESEARCH

As foreshadowed in the discussion, the research team has several suggestions for further study. The most obvious areas are in the kinesthetic and sensory aspect of students struggling with reading acquisition. We feel a case study exploring broad sensory mechanisms in connection with reading difficulties could be a helpful next step. Whilst there is a vast amount of literature concerning reading failure, that students still fail to read indicates that we do not fully understand how to help them, or all of the mechanisms involved in reading failure. Discovering whether broad sensory difficulties contribute could be a significant addition to the literature and warrants investigation.

If more global sensory difficulties were discovered to be a significant aspect of reading difficulties, a study examining the impact that music tuition might have could be warranted. A study could give educators a greater understanding of the mechanisms involved in reading failure and a greater picture of how music can help restore networks necessary for effective reading.

As mentioned earlier in the discussion, it would be extremely worthwhile to explore whether it was the combination of movement, sound and symbol as opposed to learning a musical instrument which caused the change in students' reading achievement in the Carinya project. A reading intervention incorporating movement and gesture connected to reading symbols with a second cohort participating in music activities could highlight some of the mechanisms at work.

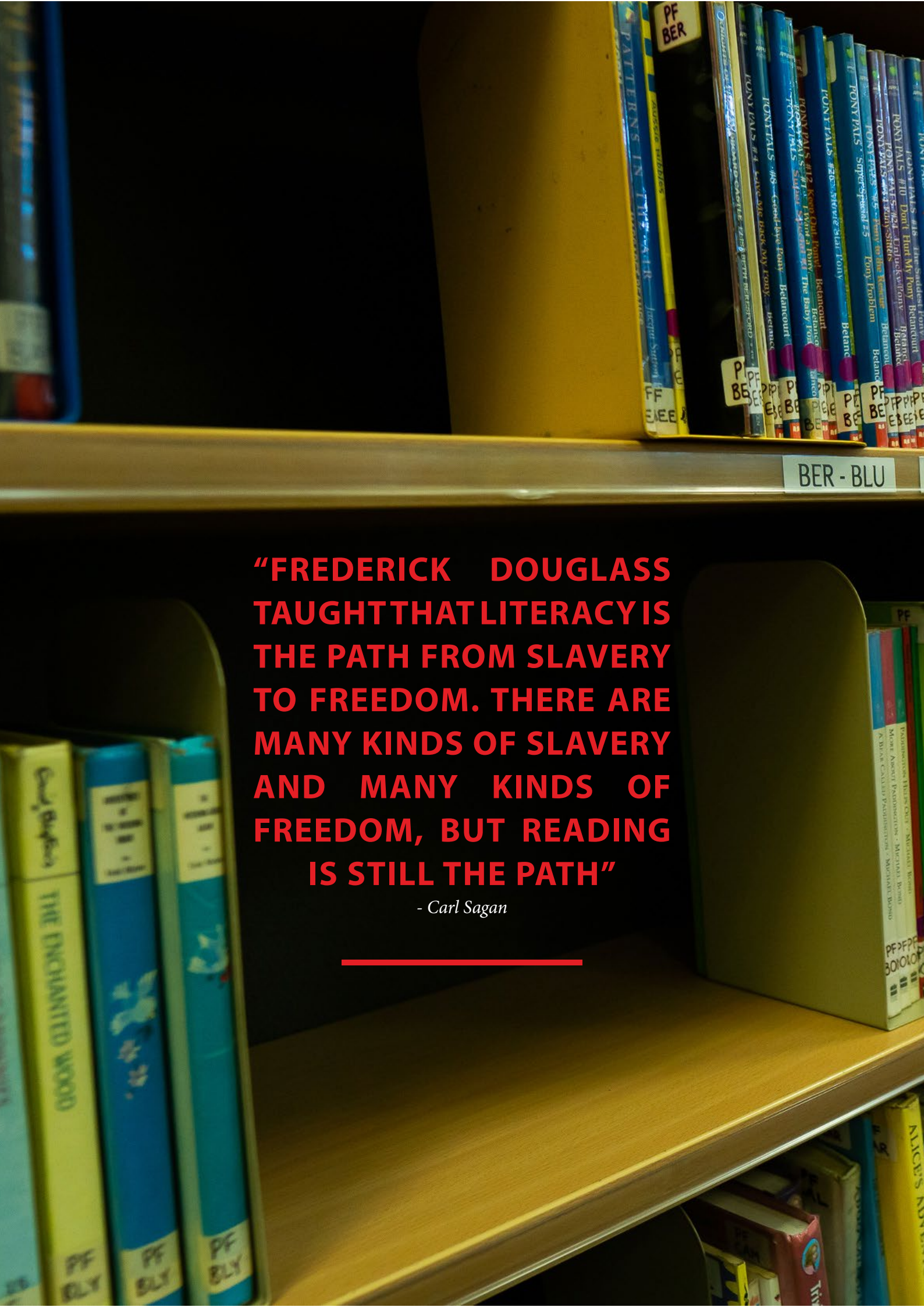
One final suggestion for consideration of further research is purposefully examining the impact music tuition can have upon the motivational profile of students who struggle with learning difficulties. These students are at high risk of disengaging from school work and a targeted study examining if music could have a positive impact upon their view of schooling could be instructive. This could verify the empirical data that emerged from the Carinya study, with actual measurements of change from the beginning of interventions through to the end of the intervention.

Conclusion

The Music Project research conducted at Carinya in 2018 and 2019 clearly shows that music tuition has made a difference in improving the reading standards for students involved in the Music Group. The effect size as measured when PAT-RC percentile results of the Music Group were compared with the Control Group was very large and indicated a strong correlation between reading improvement and involvement in instrumental music lessons. The triangulation with PROBE 2 results supported the idea that music tuition made a difference to students' reading standards.

It was never the intention of the Music Project research team to explore the mechanisms behind reading improvement, rather, it was to see if the more theoretical findings of previous researchers could be applied in a school context with readers who struggle. Even so, the interview data of students and the observations of teachers gave a rich picture of both the difficulties students face and some of the mechanisms behind the success that the students have experienced.

We assert that music tuition has a place in intervening in the learning of struggling readers. Even without the benefits to reading, the social and emotional benefits have been enormous for the students involved in the project. The significant improvement in the students' reading points to music being a potent tool to use in the classroom.

A photograph of a library shelf. The top shelf contains a series of blue books titled 'PONY PALS' with various numbers and titles. A white label on the shelf edge reads 'BER - BLU'. The bottom shelf contains books with yellow and blue spines, including 'THE ENCHANTED WOOD'. A quote is overlaid in the center of the image.

**“FREDERICK DOUGLASS
TAUGHT THAT LITERACY IS
THE PATH FROM SLAVERY
TO FREEDOM. THERE ARE
MANY KINDS OF SLAVERY
AND MANY KINDS OF
FREEDOM, BUT READING
IS STILL THE PATH”**

- Carl Sagan



Pony Pals

BON - BRO

Research to Practice Impact

The School Based Research Project has provided Carinya with an opportunity to gain a larger perspective in the educational domain. Through participating in the project, team members have enjoyed learning about research and how it is impacting on schools around Australia. It also provided a chance for our lead researcher to visit another country and see how they are using music to create change in their school in England. Meeting other research teams has allowed us a valuable insight into what other schools are doing and enabled us to be part of an engaging discourse focused on improving student outcomes.

The Research Project has helped key staff to engage with the skills and techniques of research practice. This has allowed us to apply these skills in our school, giving us a lever for change. Through the detailed examination research demands, we have been able to consider both areas within, and beyond our area of study. These areas of interest for future examination include:

- Assessment and reporting
- Student motivation and engagement
- Tracking student growth in numeracy and literacy
- Methods of literacy intervention

The Research Project has provided a vehicle for the professional development of the team leaders. The Team Leader has had opportunities to present her findings at a range of educational events around Australia. This has helped to promote her own professional capacity, which in turn builds capacity in the school. The research has also been showcased in local and national media, which we hope will encourage other schools to consider the benefits of music tuition.

Currently we are looking at ways of how we can translate our research into practice. This will be a longer term project, where we hope to bring different sorts of music tuition into the classroom. While this project focused on Middle School students we would like to expose students

to music tuition at a younger age, to provide a greater opportunity to make a cognitive change in the students.

While the project was about learning to read, there were considerable benefits of what the students learnt about playing music. Students identified success in their learning, most of them could play over 100 pieces. Students enjoyed playing together and showed a greater degree of confidence and self-efficacy as a result of their participation in the

project. Watching students choose music as an elective in Year 9 shows a change in attitude and a recognition that they can achieve.

Finally the project was about helping students to become stronger readers. From the project we are now engaged in robust discussions on how we can facilitate this for students. As a fundamental skill to learning, we aim to examine our approach to reading intervention and how we can best help those students in need.



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PROBE 2 - Test sample

PROBE² RECORDING SHEET		NAME _____	AGE _____
©Toluse Initiatives 2011. This paper can be copied from this BLUE MASTER ONLY		ASSESSOR _____	DATE _____
SET 1 FICTION Decoding 5.0 - 8.0 THE BIRD IN THE TREE		OPTION (circle) 1 2 3 4	STUDENT'S MUST NOT READ FROM THIS SHEET Student's Mark 5
<p>At the top of a hill there was a big tree. A bird sat high up in the tree. <u>All day long</u> the bird sang. "I can see the sky. I can see all the way down the hill," it sang. One day a cat went up the hill to the tree. The cat was hungry. It was going to get the bird and eat it. But when it got there the bird had gone.</p>			
ORAL READING ANALYSIS - OPTION 1 ONLY		COMMENT:	
SELF-CORRECTIONS ... ACCURACY: ... (75 (72 + 96%)) ... % BEHAVIOURS: SPEED high _____ low _____ HESITATION low _____ high _____ ALL WORDS IN COUNT OMISSION low _____ high _____ INSERTION low _____ high _____ DEPENDENCE low _____ high _____			
COMPREHENSION QUESTIONS Write down student's responses - NOT just a tick or a cross.			
<p>LI <input type="checkbox"/> 1. Where was the big tree?</p> <p>RO <input type="checkbox"/> 2. What things did the bird sing about?</p> <p>IN <input type="checkbox"/> 3. How did the cat know the bird was there?</p> <p>VO <input type="checkbox"/> 4. 'All day long the bird sang.' What do the words <u>All day long</u> mean here?</p> <p>EV <input type="checkbox"/> 5. Why had the bird gone when the cat got to the tree?</p> <p>RA <input type="checkbox"/> 6. Was it right for the cat to try to get the bird? Why do you think that?</p>			
COMPREHENSION ANALYSIS		COMMENT:	
LI LITERAL /1	RO REORGANISATION /1		
IN INFERENCE /1	VO VOCABULARY /1		
EV EVALUATION /1	RA REACTION /1		
TOTAL / 6	% minimum pass 70% (4/6)		
NO 1/2 MARKS / 70%+ try a set up. If below 70% try a set down		Fiction decision: <input type="checkbox"/> up <input type="checkbox"/> down <input type="checkbox"/> final	

The PROBE 2 reading comprehension assessment allows teachers to keep a running record when students are reading a passage. They then record their answers and mark the comprehension questions accordingly. It is necessary to pass both the reading and comprehension component to move forwards to the next text.

PAT-RC sample

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
End																																		

IMPRESSIONS

Mrs Fox flopped onto the bench seat outside the fruit shop. Even with the pull-along trolley her daughter had bought her, that last hill, up the main street towards home, got steeper every year. Not that anyone cared. Young people these days were so selfish. Look at that fellow lounging at the end of the bench – tattoos all over his arms. He should be at work!

Dan thought the old lady looked plain worn out. He would offer to take her home but he'd volunteered to accompany his nephew Jason to the dentist. Dan worked night shift and didn't mind helping his busy sister out.

Mrs Fox noticed the man glancing her way. Probably a thief, who preyed on the unwary and the vulnerable. She sniffed and turned away.

Dan was thinking how uncomfortable the poor old lady looked. Maybe she could use a cold drink. If it was his own grandmother he'd like someone to show a bit of care. But Jason might worry if he wasn't there.

Mrs Fox struggled to her feet. She wouldn't stay sitting next to that lout a moment more. She yanked at her trolley. He could have the whole bench to himself.

Jason arrived a minute later. He pointed to the vacated seat. 'Look, Uncle.' A purse lay towards the back of the planks. Dan grabbed it. 'Quick, follow me,' he said. The old lady was trudging along, muttering to herself.

'Hey!'

Mrs Fox turned at his shout.

'Yours?' Dan smiled, holding out the purse. Mrs Fox hesitated a moment. She slowly put out a shaky hand, then quickly snatched the purse from him. She shoved it into the side pocket of her trolley.

'She didn't even say thank you,' Jason said, as they watched the figure of the old woman retreating rapidly up the road.

'She's probably a bit flustered, that's all,' said Dan.

Further up the street, Mrs Fox hurried guiltily homewards, with someone else's purse.

Why does Mrs Fox feel the road gets steeper every year?

- She has changed the way she walks home.
- Her trolley gets heavier with more groceries each year.
- As she gets older it takes more of an effort to climb hills.
- She is confused and thinks the incline of the road has changed.

Next

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
End																																		

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'She's probably a bit flustered, that's all,' said Dan.

Further up the street, Mrs Fox hurried guiltily homewards, with someone else's purse.

What was Mrs Fox doing when she first saw Dan?

- going home
- visiting her daughter
- beginning her shopping
- planning to steal a wallet

Next

Back

ETHICS APPROVAL

Dear Anita

The Human Research Ethics Committee has considered your application to conduct research with human subjects for the project 20180118 - Raising Reading Standards Through Targeted Music Tuition.

The Committee made the following evaluation: **Approved**

The approval is valid until: 30/11/2019

The following general conditions apply to your approval. These requirements are determined by University policy and the *National Statement on Ethical Conduct in Human Research* (National Health and Medical Research Council, 2007).

Monitoring

You must assist the Committee to monitor the conduct of approved research by completing project review forms, and in the case of extended research, at least annually during the approval period.

Reporting Adverse Events

You must report any unexpected adverse events or complications that occur anytime during the conduct of the research study or during the follow up period after the research. Please refer these matters promptly to the HREC. Failure to do so may result in the withdrawal of the Ethics approval.

Discontinuation of Research

You must inform the Committee, giving reasons, if the research is not conducted or is discontinued before the expected date of completion.

Extension of Approval

If your project will not be complete by the expiry date stated above, you must apply for extension of approval. This must be done before current approval expires.

Retention and Storage of Data

University policy states that all research data must be stored securely, on University premises, for a minimum of five years. You must ensure that all records are transferred to the University when the project is complete.

Contact Details and Notification of Changes

All email contact should use the UC email address. You should advise the Committee of any change of address during or soon after the approval period including, if appropriate, email address(es).

Please do not hesitate to contact us via email humanethicscommittee@canberra.edu.au if you require any further information.

All the best,

Hendryk Flaegel

Research Ethics & Integrity
Research Services
University of Canberra

PARTICIPANT INFORMATION: STUDENTS



Participant Information Sheet - Students

This is a project specific Participant Information Sheet. It restricts the use of the data collected to the named project by the named investigators:

Dr Anita Collins, Debra Batley, David Jones, Aaron McDonald, Lauren Ferguson.

Project Title: Raising Reading Standards through Targeted Music Tuition

Who is carrying out the study?

You are invited to participate in a study conducted by Debra Batley as part of Carinya Christian School's "School Based Research Project".

What is the study about?

The purpose is to investigate whether targeted music tuition can improve reading standards with students experiencing learning difficulties associated with reading.

What does the study involve?

Debra Batley and Lauren Ferguson will be involved in teaching students wind band instruments, both in small groups and as members of ensembles. Mr Jones and Mr McDonald will be monitoring reading and Dr Anita Collins is our specialist mentor.

We would also like to conduct a short interview with you at the beginning of the study, one at the half way point (September 2018) and one towards the end (September 2019).

Any test data that is being used in the study is part of the normal teaching and learning program of the school, and are tests that you would normally undertake whether involved in the study or not. We are analysing the data from these tests to help measure the effect of music tuition.

How much time will the study take?

You will be committing to 1 25 minute small group lesson a week, and 1 40 minute ensemble practice a week.

You will also do a 15-30 minute interview with us at the beginning of the study, one in September 2018 and one in September 2019.

Will the study benefit me?

You will be given a musical instrument for 7 school terms, and be taught to play this instrument. It is possible you may also notice an improvement in your reading.

Will the study have any discomforts?

No.

How is this study being paid for?

The Association of Independent Schools has provided funding for this Study and Carinya is meeting the cost of providing musical instruments.

Will anyone else know the results? How will the results be disseminated?

All aspects of the study, including results, will be confidential and only the researchers will have access to information on participants.

We will be sending you an Interim Report on the Study in November 2018, and a Final Report on the Study in December 2019. These reports will include data based on how the whole group in the study has fared, and individual details concerning how you have gone. Additionally, as part of the school reports we will be including a section on how you are progressing in learning to play your musical instrument.

Debra Batley will also be presenting a report on the Study at both the 2018 and 2019 AIS research Symposiums and also the 2019 ASME Conference.

Can I withdraw from the study?

Participation in the study is entirely voluntary: you are not obliged to be involved and - if you do participate - you can withdraw your permission for access to work samples at any time without giving any reason and without any consequences.

Can I tell other people about the study?

Yes, you can tell other people about the study by providing them with the chief investigator's contact details. They can contact the chief investigator to discuss their participation in the research project and obtain an information sheet.

What will Happen to the Data

The data will be stored in a secure online server which is password protected. This includes any audio or video files. All data will be de-identified and students will be given a unique code. The key to this code will be kept in a locked filing cabinet. At the end of the study all Data will be transferred to the University of Canberra's Secure Servers where it will be kept for 5 years. After 5 years it will be destroyed.

What if I require further information?

When you have read this information, Debra Batley will discuss it with you further and answer any questions you may have. If you would like to know more at any stage, please feel free to contact Debra Batley on batleyd@carinya.nsw.edu.au or 02 67620970.

What if I have a complaint?

This study has been approved by the University of Canberra Human Research Ethics Committee. The Approval number is 20180118.

If you have any complaints or reservations about the ethical conduct of this research, you may contact the Ethics Committee through the Office of Research Services via email: [**humanethicscommittee@canberra.edu.au**](mailto:humanethicscommittee@canberra.edu.au).

Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

If you agree to participate in this study, you may be asked to sign the Participant Consent Form.

PARTICIPANT INFORMATION: PARENTS



Participant Information Sheet - Parents

Project Title: Raising Reading Standards through Targeted Music Tuition

Who is carrying out the study?

Your child is invited to participate in a study conducted by a research team led by Debra Batley as part of Carinya Christian School's "School Based Research Project".

What is the study about?

The purpose is to investigate whether targeted music tuition can improve reading standards with students experiencing learning difficulties associated with reading.

What does the study involve?

Debra Batley and Lauren Ferguson will be involved in teaching students wind band instruments, both in small groups and as members of ensembles. Aaron McDonald and David Jones will be monitoring student's reading.

How much time will the study take?

Your child will be committing to 1 25 minute small group lesson a week, and 1 40 minute ensemble practice a week. We will want to have a short interview with you at the beginning of the study, one at the half way point (September 2018) and one towards the end (September 2019). Each interview will go for 15 minutes to half an hour.

Will the study benefit your child?

Your child will be given a musical instrument for 7 school terms, and be taught to play this instrument. It is possible you may also notice an improvement in their reading.

Will the study have any discomforts?

No.

How is this study being paid for?

The Association of Independent Schools has provided funding for this Study and Carinya is meeting the cost of providing musical instruments.

Will anyone else know the results? How will the results be disseminated?

All aspects of the study, including results, will be confidential and only the researchers will have access to information on participants.

Debra Batley will be presenting information about the study at a National Conference for Music Educators in 2019. The research team will also be presenting some of their findings at the AIS Research Symposiums in 2018 and 2019.

The research team will also be writing Journal articles on the overall study. It is possible the research team may use the data gained from this study as a starting point for further research.

Can I withdraw from the study?

Participation in the study is entirely voluntary: you are not obliged to be involved and - if you do participate - you can withdraw your permission for access interview transcripts and your child's involvement at any time without giving any reason and without any consequences.

Can I tell other people about the study?

Yes, you can tell other people about the study by providing them with the chief investigator's contact details. They can contact the chief investigator to discuss their participation in the research project and obtain an information sheet.

What if I require further information?

When you have read this information, Debra Batley will discuss it with you further and answer any questions you may have. If you would like to know more at any stage, please feel free to contact Debra Batley on batleyd@carinya.nsw.edu.au or 02 67620970.

What if I have a complaint?

This study has been approved by the University of Canberra Human Research Ethics Committee. The Approval number is 20180118.

If you have any complaints or reservations about the ethical conduct of this research, you may contact the Ethics Committee through the Office of Research Services via email: humanethicscommittee@canberra.edu.au.

Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

If you agree to participate in this study, you may be asked to sign the Participant Consent Form.

PARTICIPANT INFORMATION: TEACHERS



Participant Information Sheet - Teachers

This is a project specific Participant Information Sheet. It restricts the use of the data collected to the named project by the named investigators:

Dr Anita Collins, Debra Batley, David Jones, Aaron McDonald, Lauren Ferguson.

Project Title: Raising Reading Standards through Targeted Music Tuition

Who is carrying out the study?

You are invited to participate in a study conducted by a research team led by Debra Batley as part of Carinya Christian School's "School Based Research Project".

What is the study about?

The purpose is to investigate whether targeted music tuition can improve reading standards with students experiencing learning difficulties associated with reading.

We are running a longitudinal cohort study, which means we are comparing the data of our focus intervention group, with the data of other students in the entire cohort of students in Years 5-8.

What does the study involve?

Debra Batley and Lauren Ferguson will be involved in teaching students wind band instruments, both in small groups and as members of ensembles. Aaron McDonald and David Jones will be monitoring student's reading.

Dr Anita Collins is an Adjunct Professor with the University of Canberra and is Acting as a Specialist Mentor to the project.

We would like to conduct a short interview with you at the beginning of the study, one at the half way point (September 2018) and one towards the end (September 2019). We will also be conducting interviews with students and parents. It is possible these interviews may take alternative form of a survey.

Any test data that is being used in the study is part of the normal teaching and learning program of the school, and are tests that students would normally undertake whether involved in the study or not. However we will be analysing this data and including it in our discussion of results of the study.

How much time will the study take?

Your students in the focus group will be committing to 1 25 minute small group lesson a week, and 1 40 minute ensemble practice a week. We will want to have a short interview these students at the beginning of the study, one at the half way point (September 2018) and one towards the end (September 2019). Each interview will go for 15 minutes to half an hour. We would also like to conduct interviews with you in the same time frame.

Will the study benefit students?

Students will be given a musical instrument for 7 school terms, and be taught to play this instrument. It is possible you may also notice an improvement in their reading.

Will the study have any discomforts?

No.

How is this study being paid for?

The Association of Independent Schools NSW has provided funding for this Study and Carinya is meeting the cost of providing musical instruments.

Will anyone else know the results? How will the results be disseminated?

All aspects of the study, including results, will be confidential and only the researchers will have access to information on participants.

Debra Batley will be presenting information about the study at a National Conference for Music Educators in 2019. The research team will also be presenting some of their findings at the AIS Research Symposiums in 2018 and 2019.

The research team will also be writing Journal articles on the overall study.

We will be sending you an Interim Report on the Study in November 2018, and a Final Report on the Study in December 2019. These reports will include data based on how the whole group in the study has fared, and individual details concerning your students. Additionally, as part of the school reports we will

be including a section on how students are progressing in learning to play their instrument.

Can I withdraw from the study?

Participation in the study is entirely voluntary: you are not obliged to be involved and - if you do participate - you can withdraw your permission for access to interview transcripts at any time without giving any reason and without any consequences.

Can I tell other people about the study?

Yes, you can tell other people about the study by providing them with the chief investigator's contact details. They can contact the chief investigator to discuss their participation in the research project and obtain an information sheet.

Data Storage

The data will be stored in a secure online server which is password protected. This includes any audio or video files. All data will be de-identified and students will be given a unique code. The key to this code will be kept in a locked filing cabinet. At the end of the study all Data will be transferred to the University of Canberra's Secure Servers where it will be kept for 5 years. After 5 years it will be destroyed.

Future Projects

It is possible the group level data (based around how the whole group progressed) may be used as the basis for comparison in a future study. No individual data will be used in future studies.

What if I require further information?

When you have read this information, Debra Batley will discuss it with you further and answer any questions you may have. If you would like to know more at any stage, please feel free to contact Debra Batley on batleyd@carinya.nsw.edu.au or 02 67620970.

What if I have a complaint?

This study has been approved by the University of Canberra Human Research Ethics Committee. The Approval number is 20180118.

If you have any complaints or reservations about the ethical conduct of this research, you may contact the Ethics Committee through the Office of Research Services via email: [**humanethicscommittee@canberra.edu.au**](mailto:humanethicscommittee@canberra.edu.au).

Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

If you agree to participate in this study, you may be asked to sign the Participant Consent Form.

CONSENT FORM FOR STUDENTS



Consent Form - Student

This is a project specific consent form. It restricts the use of the data collected to the named project by the named investigators: Anita Collins, Debra Batley, David Jones, Aaron McDonald, Lauren Ferguson.

Project Title: Raising Reading Standards through Targeted Music Tuition

I,, consent to participate in the research project titled: Raising Reading Standards through Targeted Music Tuition.

I acknowledge that:

I have read the participant information sheet and have been given the opportunity to discuss the information and my involvement in the project with the researcher.

The procedures required for the project and the time involved have been explained to me, and any questions I have about the project have been answered to my satisfaction.

I consent to making samples of my work available.

I consent to having some small group lessons videoed.

I consent to having some ensemble rehearsals and performances videoed.

I consent to being involved in short interviews with the researchers.

I understand that my involvement is confidential and that the information gained during the study may be published but no information about me will be used in any way that reveals my identity.

I understand that I can withdraw from the study at any time, without affecting my relationship with the researcher/s now or in the future.

If you do not consent, written and audio data about your work sample will be destroyed.

Signed: _____

Name: _____

Date: _____

Return Address: _____

This study has been approved by the University of Canberra Human Research Ethics Committee. The Approval number is: 20180118

If you have any complaints or reservations about the ethical conduct of this research, you may contact the Ethics Committee through the Office of Research Services via email: **humanethicscommittee@canberra.edu.au**. Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

CONSENT FORM FOR PARENTS



Consent Form - Parent

This is a project specific consent form. It restricts the use of the data collected to the named project by the named investigators: Anita Collins, Debra Batley, David Jones, Aaron McDonald, Lauren Ferguson.

I,, consent to participate in the research project titled: Raising Reading Standards through Targeted Music Tuition.

I acknowledge that:

I have read the participant information sheet and have been given the opportunity to discuss the information and my involvement in the project with the researcher.

The procedures required for the project and the time involved have been explained to me, and any questions I have about the project have been answered to my satisfaction.

I have discussed participation in the project with my child and my child agrees to their participation in the project.

I understand that my child's involvement is confidential and that the information gained during the study may be published but no information about my child will be used in any way that reveals my child's identity.

I consent to the work samples created by my child being accessed for this project. Please cross out any activity that you do not wish your child to participate in:

- having samples of their work available i.e Progressive Achievement Test (PAT) in Reading and Comprehension answers

- some small group lessons videoed
- some ensemble rehearsals videoed
- some performances videoed
- semi-structured interviews videoed

I understand that videos will not be shown to anyone other than the research team and will be purely for analysis and transcription purposes for the researchers – i.e to see student behavior in a rehearsal.

If you do not consent, written and audio data about your child's work sample will be destroyed.
I consent to being involved in short interviews with the researchers.

I understand that my involvement is confidential and that the information gained during the study may be published but no information about me will be used in any way that reveals my identity.

I understand that my child's participation in this project is voluntary. I can withdraw my child from the study at any time, without affecting their academic standing or relationship with the school and they are free to withdraw their participation at any time.

I understand that I can withdraw from the study at any time, without affecting my relationship with the researcher/s now or in the future.

If you do not consent, written and audio data about your work sample will be destroyed.

Signed: _____

Name: _____

Date: _____

Return Address: _____

This study has been approved by the University of Canberra Human Research Ethics Committee. The Approval number is: 20180118

If you have any complaints or reservations about the ethical conduct of this research, you may contact the Ethics Committee through the Office of Research Services via email: **humanethicscommittee@canberra.edu.au**. Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

CONSENT FORM FOR STAFF



Consent Form - Staff

This is a project specific consent form. It restricts the use of the data collected to the named project by the named investigators: Anita Collins, Debra Batley, David Jones, Aaron McDonald, Lauren Ferguson.

I,, consent to participate in the research project titled: Raising Reading Standards through Targeted Music Tuition.

I acknowledge that:

I have read the participant information sheet and have been given the opportunity to discuss the information and my involvement in the project with the researchers.

The procedures required for the project and the time involved have been explained to me, and any questions I have about the project have been answered to my satisfaction.

I understand that videos will not be shown to anyone other than the research team and will be purely for analysis purposes for the researchers – i.e to transcribe semi-structured interviews.

I consent to being involved in short interviews with the researchers and completing short surveys.

I understand that my involvement is confidential and that the information gained during the study may be published but no information about me will be used in any way that reveals my identity.

I understand that I can withdraw from the study at any time, without affecting my relationship with the researcher/s now or in the future.

If you do not consent, written and audio data about your interview will be destroyed.

Signed: _____

Name: _____

Date: _____

Return Address: _____

This study has been approved by the University of Canberra Human Research Ethics Committee. The Approval number is: 20180118

If you have any complaints or reservations about the ethical conduct of this research, you may contact the Ethics Committee through the Office of Research Services via email: [**humanethicscommittee@canberra.edu.au**](mailto:humanethicscommittee@canberra.edu.au). Any issues you raise will be treated in confidence and investigated fully, and you will be informed of the outcome.

PRE INTERVIEW QUESTIONS: STUDENTS

1. What is your birthdate?
2. Do you have any older brothers or sisters?
3. Do you have any younger brothers or sisters?
4. What year group are you in?
5. What language do you speak at home?
6. Who takes care of you most of the time?
7. What kind of books do you like reading?
8. How much time do you spend reading each day?
9. How much time do you spend reading each week?
10. How many times a week do your parents read to you? What is your favourite book for them to read to you?
11. How do you feel about school? Happy? Stressed? Confused? Neutral?
12. What do you like most about school?
13. What do you least like about school?
14. How much time do you spend travelling to school each day?
15. Have you learnt a musical instrument before? If yes, what instrument? How long did you learn for?
16. Do you get to choose the music that you listen to at home? If yes, what type of music do you listen to?
If no, who chooses the music you listen to? What style of music do you listen to?
17. How much time do you listen to music at home each day?
18. Do you have a favourite music to listen to this week?
19. How often in a week would you hear music at home?
20. How often in a week would the television be on at home?
21. How often in a week would you play computer games at home?

MID AND POST INTERVIEW QUESTIONS: STUDENTS

1. How old are you?
2. Can you tell me about how music is going?
 - What are you enjoying?
 - How do you feel after lessons?
 - What do you like about your instrument?
 - What have you found difficult about learning your instrument?
 - How do you feel about yourself when you are playing your instrument?
3. Can you tell me how your practice is going?
 - What is working well for you in practice?
 - What is your practice routine like?
 - What is your practice space like?
 - What is one of the main things that stops you practicing?
4. Can you tell me about the ensemble/ band? How is that going for you?
 - What are you enjoying?
 - What are the pieces you have enjoyed the most?
 - What is it about them, that has made the pieces enjoyable?
 - What has been difficult about being in an ensemble?
5. Can you tell me about how reading is going for you?
 - What do you enjoy about reading?
 - What books do you really enjoy reading?
 - What do you find hard about reading?
 - What impact do you feel learning music has had on reading?
6. Can you tell me how school is going for you?
 - What is going really well?
 - What makes you feel good at school?
 - What is difficult at school?
 - If you could change one thing about school, what would you change?
7. Has Music changed the way you feel about:
 - School?
 - Reading?

TEACHER SURVEY - TEACHING READING

SEMI-STRUCTURED INTERVIEW QUESTIONS WITH TEACHERS

1. How long have you been teaching reading?
2. How do you feel about teaching reading?
3. What do you think are the most effective strategies for students who have learning difficulties struggling with reading?
4. What are the range of strategies you try in the classroom?
5. Thinking of the cohort of students involved in the project, do they have different characteristics in the classroom compared to students who do not have learning difficulties associated with reading? What are these characteristics specifically?

Following questions to be asked about each student teacher teaches:

1. Thinking about student How organised are they in the classroom?
2. Do you feel that they have a specific problem with reading or are their learning difficulties more complex? How would you describe them as a learner?
3. What do you perceive to be their biggest area of strength as a learner?
4. What do you perceive to be their biggest area of weakness as a learner?
5. What other interventions are being used with them?
6. What do you perceive their attitude to the music intervention being?
7. Do you have to remind them to go to music lessons - or are they self motivated to get there?
8. What is their demeanor after music lessons?

The following questions are to be added to the interview as part of the post interview:

1. Thinking about student Have you noticed an improvement in their organisation in the classroom? If yes, how can you see this?
2. Have you noticed any other changes in their learning profile? If yes, how would you describe this?
3. Have their learning strengths changed? If yes, how?
4. Have their learning weaknesses changed? If yes, how?
5. Have the interventions being used with them, changed - can you describe what they are, and what your assessment of their impact is?
6. What do you think their attitude to music lessons has been? Has it changed over the course of the project?
7. Do you think they have fully engaged with the Music Project?

BIOGRAPHIES

DEBRA BATLEY - Lead Researcher

Debra Batley has been a classroom music teacher at Carinya Christian School since 2004. She is also the NSW State Chair of The Australian Society for Music Education (ASME) which exists to encourage and advance music education at all levels as an integral part of general education and community life. With over 25 years experience in music education ranging from the music studio to the classroom, she is a passionate advocate for the provision of high quality music education for all students. Since 2015 she has also written educational resources for Sydney Symphony Orchestra. In her spare time she directs community choir 'Check Spelling Before Printing', a choir that celebrates the idea that singing is for everyone, even those of us who can't

DAVID JONES - Team Member

David was born in Wales before migrating to Australia, completing his Secondary Schooling in Armidale. He completed a Bachelor of Arts and a Graduate Diploma in Education. David has taught in Sydney and Canberra before accepting a position in Carinya Christian School Tamworth. He completed a Preliminary Certificate in Theology, through Moore College and a Masters Degree in Education through UNE. David worked as a Head of Department, Head of Middle School and Director of Studies before accepting the position of Principal in 2016. David loves spending time with his family, bushwalking and serving Jesus through education.

AARON MCDONALD - Team Member

Aaron McDonald is the Learning Support Coordinator at Carinya Christian School. He is passionate about supporting students with additional learning needs and sees this research project as a great opportunity to support students who struggle with reading. He has already seen the positive impact that learning a musical instrument has had on many of our students. It has given many of them an opportunity to experience success. This cannot be underestimated given the various backgrounds of the students, as well as their academic profiles.

LAUREN FERGUSON - Team Member

Lauren graduated with a Bachelor of Music (Performance) and a Graduate Diploma of Music (Performance) from the Australian National University School of Music in 2001 and 2002 respectively. She performed with the Canberra Symphony Orchestra, The Canberra Wind Soloists, The Australian Youth Orchestra, and the Tasmanian Symphony Orchestra. She is blessed to have been on staff at Carinya Christian School since late 2013 and is working her way through Orff Schulwerk Levels having undertaken Level 3 in 2018. Lauren has a deep love for chamber music and long distance triathlon. She aspires to race her first full ironman.

DR ANITA COLLINS - Specialist Mentor

Dr Anita Collins is an award-winning educator, researcher and writer in the field of brain development and music learning. She is internationally recognized for her unique work in translating the scientific research of neuroscientists and psychologists to the everyday parent, teacher and student. Anita brings a wealth of experience as an active educator to every presentation. She is an experienced classroom teachers and conductor (Canberra Grammar School), has been musical director for three award winning productions and she has over a decade of experience as a teacher educator across all areas of tertiary education (University of Canberra and the Australian National University).

DR LINDA LORENZA - Critical Friend

Linda currently lectures in Theatre at Central Queensland University. She completed her Phd in arts education at the University of Sydney, undertaking case study research into teachers' perceptions of change through the new Australian Arts Curriculum. Her tertiary qualifications encompass linguistics, opera, drama, theatre and education. She is a determined vocalist and educator. Having taught drama, music, English and voice in schools, she was Head of Education for Bell Shakespeare for five years and has dedicated five years at ACARA working on the development of Australian Arts curriculum. She has tutored and lectured at the Universities of Sydney and Western Sydney. Previous to taking up her current position, Linda was Director Learning & Engagement for the Sydney Symphony Orchestra.

ACKNOWLEDGEMENTS

The Music Project team acknowledges the invaluable assistance and support from AISNSW. Without their funding, this project would have never taken place. In particular, we acknowledge the Research and Data division team from AISNSW, including Tiffany Roos and Lesley Wright, whose constant support and guidance has been invaluable.

Our Current school principal David Jones and the Carinya School Board's trust in us has been instrumental in the project going ahead. We thank them for their belief in the cause and the way in which they have fostered and developed the project at every stage. In particular the significant financial contribution from Carinya Christian School was essential to the success of the project.

We cannot give enough thanks to our specialist mentor Dr Anita Collins. Her advice, guidance and generosity with her time throughout has contributed in countless ways to the Project's success. Her ideas on music education shaped the Music Project before it was a concrete idea.

Dr Linda Lorenza's work in reviewing the Project helped us to communicate our ideas in the strongest way possible. We are most grateful for her help. We are also thankful for Dr Richard Niesche's assistance in both structuring and reviewing the literature review. His insights were incredibly helpful.

We need to thank the numerous people who assisted in the research through proofreading, conducting interviews, and transcription assistance. In particular, we are grateful for the assistance of Annette Tumbridge in conducting interviews; Erin Carter in conducting interviews and coding all qualitative data; Isobel Batley and Laura Jones for their transcription of interviews; Thomas Babici, Rachael Rassmussen, Angus Batley for their proofreading of the final report and Amy Allerton for her assistance in all graphic design aspects of the project.

A project such as this is not possible without a strong team. We could not have done this without the support and enthusiasm of the research team members, Lauren Ferguson and Aaron McDonald.

Finally, the late Richard Gill AO, was instrumental in spurring research team leader Debra Batley, to advocate for music education for every child. He was an encourager and listener, offering new perspectives up until his final days (October 2018). His thoughts on music education proved to be a catalyst for the original research idea.

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General inquiries should be directed to AISNSW Research and Data Division at randd@aisnsw.edu.au.



Carinya
CHRISTIAN SCHOOL
From Christ and For Him

 **CHRIST**  **COMMUNITY**  **DISCOVERY**

Engaging as a community to discover the world made through Jesus
for his glory

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