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Integrating music and literacy for the fostering of foundational literacy competencies for children aged 3-5 years of age: Furthering the understanding of the relationship between early musical experience and foundational literacy knowledge and skill development

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“Regardless of the musical form and despite a teacher’s level of musical training, the value of fostering creativity and enhancing literacy instruction through music is vital in today’s diverse early childhood classrooms.”

Paquette and Rieg, (2008:227)

ABSTRACT

Becoming literate is a prime expectation of all children upon school entry, yet elementary teachers face incoming classes of children with disparate literacy experiences, knowledge and skills to bring to their literacy learning, which renders the task of teaching children to read and write, one of complexity. Early inequalities in experience and development can persist and impede learning throughout school life and beyond.

Substantial, extant and growing research suggests that musical experience is correlated with various literacy competencies, yet causal evidence of musical experience upon literacy competence remains elusive, as teaching music does not teach literacy. It has been suggested that the integration of music and literacy activities may offer valuable experiences through which essential foundational knowledge and skills in the most formative early years can be established. Research in this area and particularly that of a qualitative nature and from a literacy perspective, is sparse.

This research aimed to identify the attributes of those with good literacy skills and which in those who struggle are lacking. It examines how a literacy-through-music intervention can be devised and delivered, such that these essential precursors to literacy are promoted, and the extent to which such a program could be successful. It also sought to identify the types of activity which would be most beneficial and suggests underlying mechanisms which might underpin literacy learning through a musical vehicle.

To address these aims, a qualitative study was conducted, and a program devised and delivered daily, to nine participants aged three to five years of age, over a period of six weeks. The 30–40-minute sessions were video-recorded, transcribed and analysed.

The findings of the study revealed that the integrative nature of the intervention led to the observation of evidence, suggesting that the participants were able to assimilate and progressively coalesce cognitive, language, auditory, motor, social and emotional skills, which with the explicit, literacy-focussed direction of the presenter led to the progressive development and acquisition of foundational literacy competencies over the duration of the program.

The implications of the findings are that the incorporation of a music-through-literacy intervention into early years pedagogy and early years practitioner training, would support the promotion of foundational literacy competencies prior to school entry and could also offer a panoptic view to identify children at risk of reading failure and indicate areas for additional support.

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CHAPTER ONE – INTRODUCTION

1.1 Background to the Research

The purpose of this research is to investigate the relationship between participation in an integrated music and literacy programme and the acquisition of foundational literacy skills and to further understanding of how the undertaking of integrated musical and literacy activities in the early years as defined in the Early Years Framework as pre-birth to 8 years (Scottish Government, 2009a:3) may help to foster literacy development.

Music may not get the attention it deserves of its ability to equip children with foundational learning abilities. The benefits of undertaking musical activities are however, extensive and span all age ranges (Sheppard, 2007; Arts Education Partnership, 2011). Musical activities such as singing songs and rhymes and playing percussion instruments, are not new in early years education. It has long been recognised that there is a link between these activities and benefits to literacy. There is a well-documented, close relationship between music and language (Patel, 2010, Mithen 2005, Brown, 2001), both being systems based upon sound; also, recognition that literacy competency is based upon proficient language skills (Snowling and Hulme, 2012). The close relationship between music and language may offer one reason for the beneficial effects of music upon literacy outcomes.

Literacy may be viewed as a ‘set of skills’ (Scottish Government, 2017a) and also as a set of practices (Barton and Hamilton, 2000 in Perry, 2012). Thus, literacy is not only about gaining the skills required to engage with print but also about the relationship a person has with print, how they may seek to view and use it and how they may view themselves as a user of printed materials.

The process of learning to read and write is complex. Ehri, (2005:168), refers to the process of learning to read as ‘*One of the great mysteries,*’ suggestive of this complexity. There are many variables which contribute to the process of becoming literate. Theorists and researchers continue to argue which individual variable is more important than another and to solve the mystery of why some children struggle with this process and others appear to learn very easily. Nag and Snowling, (2013:2) suggest that ‘*Reading draws upon multiple cognitive and linguistic domains in complex ways’* and that ‘*a comprehensive theoretical account about reading development remains elusive*’. The ability to read, write and comprehend text is a product of a multiplicity of skills, knowledge and experience.

Despite a wealth of correlational evidence of the relationship between musical activities (often generally defined as experience or training) and literacy outcomes, (more specifically defined for example, as phonological awareness (PA) - the awareness of sounds in words - vocabulary, word reading, auditory memory, oral language and reading comprehension), a causal relationship between the undertaking of musical activities and literacy proficiency has not been established. There have been some quasi-experimental studies which intimate the existence of

a causal relationship (Standley and Hughes, 1997; Register, 2001; Gromko, 2005 and Bolduc, 2009), also those that suggest a causal relationship between musical activities and skills which contribute to literacy (Piasta and Wagner, 2010; Putkinen et al., 2015; Moreno et al., 2011; Tierney and Kraus, 2013a and Corrigall and Trainor, 2011). There are few studies which have sought to explain the relationship between musical activities and early literacy skill development. Gromko (2005) explained the relationship as one of transference. This transfer of learning is also referred to by others. For example, Tierney and Kraus (2013a) refer to the transfer of learning from musical experience to language skills, Besson et al. (2011) also discuss evidence of transfer effects between music and language, as do Chang (2000) and Overy (2003). The existence of transference, however, is disputed by Hodkinson, et al. (2008). Degé (2021) suggests that the undertaking of music training (such as individual instrumental lessons) makes changes to the brain which may impact many cognitive abilities such as listening and sensorimotor functions, and that links to more specific areas such as language, visual-spatial and memory are less obvious. She argues that because music lessons train executive functions, these are involved in nearly all tasks; in this sense there is no actual transfer of skills, but a honing of skills which are used in many areas. Kraus (2022) argues that experience of sound, and language and music in particular, make changes to the brain and that the way a pre-literate child processes the ingredients of sound – pitch, timing and timbre – can predict future reading ability. Where music and literacy activities are combined as one this obviates the discrepancy with reference to transfer effects.

This research draws together the findings of studies which draw correlation between music and literacy and first seeks to examine the relationship by identifying areas of overlap and evidence of the beneficial effects of musical experience upon literacy proficiency. By the presentation of a literacy programme which was specifically designed to promote skills required for literacy through musical activities, the researcher was able to investigate the extent to which children were able to acquire and apply this range of essential pre-literacy skills simultaneously and sought evidence as to how this might occur.

Interventions where music and literacy activities have been deliberately integrated with the purpose of improving literacy skills have shown the greatest gains, for example those of music therapists, in particular (Roskam, 1979; Standley and Hughes, 1997 and Register et al., 2007). Research in this area is quite sparse and therefore this work seeks to investigate further the value of integrated music and literacy activities.

Becoming literate however, is not only dependent upon competency in various skills. It is dependent upon a relationship with literacy practices. The extent of a child's experience of and interaction with print, relies upon that of those around them, their involvement and observance of literacy practices. For some children this is extensive, with parents actively involving children in their reading and writing activities and encouraging children to engage with text themselves. For others, this is not the case. The term 'socio-cultural' describes the inter-relationship of social and cultural factors. These factors such as family habits, beliefs and views help to

shape a child's literacy experiences and subsequent proficiency. A child's sense of self-efficacy and of how they see themselves, for example, as readers, also contributes to their literacy behaviours and progress. If children see themselves as competent, confident and successful then they are more likely to be so (Handy, 1976; Bandura, 1977).

It is a task of early years settings to provide an environment which helps to foster literacy habits and positive educational values and self-image. Children need to be able to see text and understand that it has purpose before they are able to learn the intricacies of de-coding and coding it (Meek, 1982). Musical activities may have a role in helping to bring together literacy practices and skill development cognisant of a child's socio-cultural background. This research focusses on viewing the integration of music and literacy from a socio-cultural perspective whilst recognising the need for the explicit teaching of coding skills (Wolf, 2008).

In light of substantial evidence drawing correlation between music and literacy, Butzlaff (2000) posed the question '*Can Music Be Used to Teach Reading?*' and determined that the evidence was inconclusive due to lack of causal evidence. As music and literacy are separate disciplines this would seem a reasonable conclusion. Only by unifying music and literacy and using the compound to accomplish literacy outcomes, is it likely to have a causal relationship.

Simply adding a music curriculum to a general curriculum, whilst having positive effects on literacy, (Lamb and Gregory, 1993; Meyer et al., 2014) does not explicitly

teach literacy skills. Comparative skills may transfer (Gromko, 2005) but most effective is the explicit teaching of literacy skills through a musical medium such that music and literacy outcomes are integral (Douglas and Willatts, 1994; Register et al., 2007; Fisher, 2001; Overy, 2003; Schiffmacher, 2009; Piasta and Wagner, 2010; Degé and Schwarzer, 2011; Verney, 2011; Bolduc and Lefebvre, 2012).

Evidence so far suggests that it may be possible to teach children phonological awareness skills (PA) - awareness of sounds in words - through informal musical activities prior to formal schooling which may increase their chances of literacy success. (Anvari et al., 2002; Bolduc, 2009; Peynircioglu, et al., 2002; Degé and Schwarzer, 2011).

Verney (2011) compared the efficacy of a PA and a music programme and found both to be equally effective in improving PA, indicating that music 'per se' is not responsible for literacy gains but the explicit teaching of the literacy outcomes. The use of music however, may have considerable advantage over simple instruction, not least due to its engaging and enjoyable nature.

The philosophy of Fröebel (1782-1852), a German educationalist who created the concept of the kindergarten and was a pioneer of early educational reform advocated the conflation of music and language as a means of delivering his curriculum. To this end his songbook 'Mother and Cuddling Songs' (Fröebel 1895a) offered materials and advice for parents to promote education through music. These ideas permeate today's provision, valuing the role of songs and rhymes in early

learning. Fröebel recognised that using songs as a learning medium was an ideal way to engage young minds through pleasurable experience.

How a person experiences, is referred to as perception. This was explored by Merleau-Ponty (1996), a French, phenomenological philosopher. He believed that sensation creates unique experiences, as each person makes sense of the stimuli they receive dependent upon previous experience. Senses inform and create impressions in the mind. It is important that children have appropriate stimuli to create the impressions necessary for educational progression and to appreciate that each child is unique in their experiencing.

Learning is therefore a process constructed from sensory experience and thought, the environment and the people within it providing such experience. The learning of any discipline necessitates the bringing together of mind and body as these are inter-related parts of a being and each react in response to the other. Merleau-Ponty (1996) recognised this need for unity and referred to the ability to know where our body parts are, not only in relation to each other but also in space, and the ability of the brain to induce movement. The relationship between the mind and body and the role of movement in learning is further explored in this work, as evidence suggests that movement stimulates the brain. Donczik, (2001) for example, believed that exercises that crossed the midline (an imaginary line down the middle of the body) improved reading rates and comprehension in children by activating communication between both hemispheres of the brain. The programme ‘Brain Gym’ utilising these ideas was introduced into primary schools (1990s) based on the earlier work of

Dennison (reprinted 2010). Claims made by Brain Gym were discredited as pseudo-science in 2008 and it was criticised for lacking scientific evidence of its efficacy by a range of scientists (Sense about Science, 2008). Nevertheless, there is evidence that movement stimulates the brain (Eliot, 2000).

Jerome Bruner, (1915-2016), an American psychologist, suggested that children are active learners who construct their own knowledge, are motivated by interest and who need to build knowledge through repeated experience. Whilst children can construct their own knowledge, they also require the assistance of those with more experience. Lev Vygotsky (1896-1934) a Russian psychologist, defined such a person as a more knowledgeable other (MKO). Vygotsky's (1896-1934) socio-cultural approach to cognitive development serves to inform this research as Vygotsky saw cognitive functions (such as those required for literacy) as being socio-culturally determined (Vygotsky, 1978). In terms of literacy, early learning is determined from our environment and the people within it.

Children are able to construct knowledge through their relationships with others in their environment, through guided participation, observation and practice. If knowledge and skills are built upon prior knowledge and skills, then the learning process may be sequential or as a result of bringing together what we know in no specific sequence. Where teaching occurs in a pre-determined sequence there may be an option for the delivery to be in large to small units or small to large. Research evidence suggests that some development naturally proceeds whole to part. For example:

- Fröebel's method of development and nurture - universal to particular
- Aural perception - global to local (Brady and Shankweiler (1991)
- Motor development - gross motor to fine motor skills
- Language - whole words to part words
- Music - tuneblocks (meaningful musical units) to pitches (Bamberger, 1980 in Verney, 2011 and Bamberger, 1996)

This raises questions as to the most appropriate method of teaching and whether to start from whole or part, for example, synthetic or analytic phonics. Phonics is a method of teaching children to read and write by the matching of language sounds to their corresponding graphic equivalents. Analytic phonics begins with showing children a whole word and breaking it into sound segments which may then be found in other words, whilst synthetic phonics teaches letter sounds which are then blended (synthesised) together to form words.

As the home environment offers a child's first experience of life, then the role of adults and others in it are pivotal to early experience. They help to form not only a person's views of life but also the way in which those views are constructed. They determine the way a person comes to think and to behave. The importance therefore of the adult's or older children's roles in supporting young children's early development is significant, both in the home and in educational settings. The older people in a child's life are generally responsible for providing whatever activities children may be undertaking and for fostering early development. Parents and teachers who are able to be good role models and inspire and motivate children,

have lasting positive impact upon children's progression. Inspiring children and promoting their desire to learn offers them a promising future.

The value placed upon reading by a family, for example, will affect a child's motivation to want to learn to read. Although valued highly in many cases; this is not always so, for example, in families for which literacy may be regarded as difficult or not of prime importance to daily activity. What is embedded in the early years remains with a child throughout their lifetime and the first seven years are crucial (Brierley, 1994). Engendering a zest for learning and embedding vital early literacy knowledge and skills should be a prime concern of early years settings.

Using musical activities as a vehicle for the delivery of early learning can create a motivational and inclusive environment. Such activities could also offer the opportunity to increase language skills (Stansell, 2005), vocabulary, (Moyeda et al., 2006), oral skills (Stahl, 2014) phonological awareness and experience of relating sounds to symbols (Standley and Hughes, 1997). Evidence therefore suggests that providing such a literacy basis may facilitate the reduction in the number of children at risk of reading failure, and this may subsequently contribute to the closing of the attainment gap - the discrepancy in educational attainment of children from low-income and better off households, (Sosu and Ellis, 2014).

1.2 Literacy in Scotland

According to Scotland's educational curriculum, the Curriculum for Excellence (CfE), literacy is defined as:

> *'the set of skills which allows an individual to engage fully in society and learning, through the different forms of language, and the range of texts, which society values and finds useful.'*
> (Scottish Government, 2017a:3)

This definition draws together language and text and highlights the close relationship between language and literacy, as text is written language. The 'set of skills' referred to is not explicitly defined but is integrated in the descriptions of experiences and outcomes in the curriculum, which should be related to the society of the child. This definition fails to acknowledge that literacy is more than 'a set of skills' and it also fails to acknowledge that it evolves from experience of literacy practices.

Prior to the formal process of learning to read and write associated with school entry, children begin to learn about language and the interpretation and production of text and symbolic representation of language such as images and logos, from birth. Our living environments are full of information, persuasion and entertainment in the form of imagery and text. It is barely possible to walk in the streets of a town and be unaware of the plethora of literacy-based opportunities for engagement. However, the extent to which children's attention is drawn to this and other opportunities, may affect a child's motivation to engage with it.

In Scotland, in 2008, The Literacy Commission '*was set up in response to concerns of persistently very low levels of literacy among a significant minority of Scottish school leavers*.' (Education Scotland, 2009:3). In 2009, in the Report and Final Recommendations of the Literacy Commission, Education Scotland announced its vision for Scotland '*Zero Tolerance of Illiteracy*' (Education Scotland, 2009:3). Scotland is committed to improving literacy standards.

In order to pursue this vision, the Scottish Government published the 'Literacy Action Plan' (LAP), (Scottish Government, 2010). The plan identifies for Scotland two major policy frameworks through which action to improve literacy is focused: The Early Years Framework and Curriculum for Excellence (CfE). These are underpinned by the national programme 'Getting It Right for Every Child' (GIRFEC). Learners are supported within these frameworks to build reading, writing and communication skills. The Early Years Framework states enhanced early intervention in literacy as a medium-term priority.

The LAP states that a minority of children do not develop a good grounding in literacy skills in early primary and that *'in primary education, those from more deprived areas often fail to meet even basic standards of literacy*' (Scottish Government, 2010:1). Socio-economic status is a more major determinant of attainment in Scotland than in other countries; adults with literacy issues are more likely to have low income and lower-level employment. It is therefore important to have literacy strategies which will support all children in all areas.

The LAP promotes the benefits of play and the Government's proposal to '*develop new and innovative approaches'* (Scottish Government, 2010:8). It also states, "*We will ensure literacy will feature as a priority in training"* (p9). Currently, teachers in Scotland are not generally taught how to teach literacy as part of their teacher training and they therefore adopt the methods and reading programmes of the school they are ultimately assigned to for their probationary year and subsequent schools thereafter.

The CfE (Scottish Government, 2017) states that it is every teacher's responsibility to develop and reinforce young people's literacy skills, whatever age group or curricular subject they teach. The CfE includes a section for 'literacy across learning' (p19) to guide teachers of other subjects in promoting good literacy skills.

The 'Teaching Scotland's Future: Report of a review of teacher education in Scotland', (Scottish Government, Donaldson, 2010) stated that some newly qualified teachers themselves have difficulties with literacy, and that this needed to be addressed. In response to the recommendations of this report, diagnostic assessments in literacy to support aspiring teachers were piloted with initial teacher education students and made available from September 2013. These included knowledge and skills up to SCQF level 5. These materials are now part of the GTCS requirements for all ITA programmes. The 2015 report on the delivery of the Action Plan (Scottish Government, 2015a:3) reported '*a generally improving picture for literacy levels in Scotland.'* Early intervention was identified as a crucial key theme.

The National Improvement Plan (Scottish Government, 2023) identified further improvement in literacy, as a priority.

Highlighted areas included:

- The importance of early learning experiences and cognitive development as a basis for more formal literacy
- the need for early and co-ordinated intervention by agencies and
- support for early years practitioners.

Progress has been reported through some initiatives:

- Bookbug – library sessions
- Early Years Collaborative (EYC) (Bed time reading – test of change)
- Play Talk Read (PTR) campaign
- Play@home programme
- 27-30 month child health reviews

Inspection evidence reported that challenges remain around improving the consistency of the quality of learning and teaching and suggested the inclusion of effective listening activities.

Recommendations included:

- Early literacy should be a key part of expanded free early learning and childcare.

- Ensure that systems are put in place to ensure that any speech and language and communication difficulties are identified by the 27-30-month child health review and addressed.

- Current strategies should target those most in need.

- Automatic enrolment in public libraries for young children, families and carers.

However, the '3 to 18 Literacy and English Review' (Scottish Government, 2015b:27) reported that '*Staff report that there is an increasing number of children starting nursery with limited expressive language*.' This highlights a need to address the language skills of pre-nursery children. Research suggests that this is likely to impact subsequent literacy acquisition.

Formal teaching of literacy begins in Primary 1 – the first year of formal schooling in Scotland when children are aged between 4 ½ and 5 ½ years of age but, the LAP (Scottish Government, 2010:3) recognises that '*Literacy development starts from birth.'* This refers to the fact that children are experiencing practices and building skills which will contribute to literacy achievement as soon as they are born.

Although the LAP reported improvement, the 2014 Scottish Survey of Literacy and Numeracy (Scottish Government, 2015c, SSLN) found the overall proportion of pupils performing well or very well in reading and writing had dropped or remained

constant from 2012, (Scottish Government, 2015c). In 2019 the SSLN was replaced by the Achievement of Curriculum for Excellence Levels (ACEL).

A report from a group of charities, including *Save the Children* entitled, 'How reading can help children escape poverty' (Read On, Get On, (Scotland), 2014:2) further highlighted the need for improvement and suggested that children need to increase their engagement with reading materials, thus inferring the requirement of antecedent literacy skills. It suggests that children living in poverty in Scotland are less likely to 'read well'[1] than their classmates and states that:

> *'1 in 5 children from poor families in Scotland leaves primary school unable to read well'*.

The National Literacy Trust website states that *'1 in 4 (26.7% of 931,000) adults in Scotland experience challenges due to their lack of literacy skills.'* (NLT, 2009).

An enquiry by the RCSLT, (Royal College of Speech and Language Therapists), (RCSLT, Hartley, 2014) also reported evidence that up to 50% of children in deprived areas in the UK face speech, language and communication difficulties.

In 2019/20 statistics for the ACEL were not collected due to the COVID-19 pandemic. Statistics were collected for 2020/21 and 2021/22 (Scottish Government, 2022). Although the results for literacy showed improvement from 2021 to 2022, these were lower than 2018/19 results. The impact of COVID-19 was believed to be responsible for these results. Seventy-one percent of primary school pupils

achieved the expected CfE level for literacy in 2021/22 compared to seventy-two percent in 2018/19. These results further indicate the importance of taking action to improve children's literacy in Scotland.

Speech, language and communication are key indicators of literacy competency and difficulties are predictive of literacy difficulties (Snowling and Hulme, 2012) hence, this is an important area of focus when considering early literacy skill development. A report by Fox et al. (undated) indicates that language development is an area which was affected by the COVID-19 pandemic and most particularly in children from deprived areas. This further impacts upon children's learning. Also linked to poverty is childhood depression, which is related to key structures in the brain (Barch et al., 2016). If music can have a positive impact upon the brain (Salimpoor et al., 2011) then it is possible that using music as a learning strategy could help to ameliorate the negative effects of impoverishment in Early Learning and Childcare (ELCC) children.

Gall (2009) reported that some children start school knowing six thousand words (receptive vocabulary) while others only know five hundred. In the USA this is known as the 'vocabulary gap'. Wolf (2008) also referred to such discrepancy and to a report (Hart and Risley, 1995) which showed that there may also be a gap of up to of thirty-two million words heard by the time children are five years old, between children from middle class and those from 'underprivileged' homes. Nursery provision for two-year-olds from underprivileged homes (The Children and Young

People Scotland Act, 2014) was increased, in an attempt to impact upon this gap; such positive impact was impeded by COVID-19 pandemic.

The promotion of early literacy skills in the early years is important to the success of a nation. Brierley, (1994:23) propounded the principle that '*what is well and soundly grounded in young children is likely to remain with them'*. Evidence from Sosu and Ellis, (2014:3) referred to a gap in attainment between poor children and their peers in Scotland and that "*this gap starts in preschool years and continues throughout primary and secondary school. In most cases it widens as pupils progress through the school years*." Sosu and Klein (2021) refer to an exacerbation of 'socioeconomic inequalities in home learning' due to the COVID-19 pandemic school closures and the likely impact upon educational attainment.

A report published by HMG, (Graham, 2011:1), suggested that success or failure in early childhood has '*profound economic consequences; socially and emotionally capable people are more productive, better educated, tax-paying citizens helping our nation to compete in the global economy and make fewer demands on public expenditure*.' This applies equally across the UK and globally.

Research by Dugdale and Clark, (2008) for the National Literacy Trust (NLT) report entitled 'Literacy Changes Lives', suggested that men and women with poor literacy are least likely to be in full-time employment at the age of thirty. This has serious implications for the productivity of the economy. The report also presented research on the relationship between literacy and five areas of life: economic status,

aspirations, family life, health and civil/cultural engagement. It highlighted how low literacy levels impact upon people's ability to participate in society.

Building on the report of 2008, the 2014 NLT report (National Literacy Trust, Morrisroe, 2014:15) further examined literacy and employment and the economy, health and crime in the UK. The report suggested that '*low literacy could be a significant factor holding back growth in the UK economy*.' The number of jobs requiring a degree has overtaken the total number of posts that do not require any qualifications. It also stated, '*Improvements in literacy levels will help to close the skill gap and may help to tackle the UK productivity crisis, reduce the number of low-paid jobs and reduce inequality and poverty in the UK*'. (p16)

With regard to health, the report found that *'individuals with low literacy and education levels are more likely to be susceptible to negative health-related behaviours, such as heavy drinking, smoking and obesity'* (p21). This is particularly relevant in Scotland where these same behaviours are identified as significant and highlighted in the document, 'Moray 2023 A Plan for the Future' (Moray Community Planning Board, 2023) as areas of concern. The raising of literacy standards is a high priority for both the Scottish Government and Moray, the local authority of the home of the researcher, and the early years are highlighted as a crucial time for the establishing of secure educational foundations.

1.3 Barriers to Literacy

In 2011, Ofsted in England, undertook an investigation to identify barriers to literacy and to identify how they might best be removed. Inspectors visited educational providers across all age groups. They found that many two-year olds already had some form of social care intervention by the time they joined the nursery, inferring an already poor start for these children.

In primary schools mainly in areas of high socio-economic disadvantage challenges identified included:

- poorly developed speech, including a very limited vocabulary
- low aspirations in the home and few set routines or clear boundaries for behaviour
- poor school attendance
- a reluctance by parents and carers to engage with school and
- limited experience of life beyond the immediate community.

Children in secondary school attributed large classes, disrupted lessons and approaches to learning as contributors to lack of success in literacy and continued barriers of

- fear of losing face in class and feeling thick
- the stigma of attending a literacy class

- a fear of finding the work too hard and not passing any exams and
- a fear of bullying.

For post 16 provision additional obstacles cited included:

- socio-economic and cultural factors – high levels of deprivation and third generation unemployment
- low family aspirations and a lack of role models at home
- venue unappealing or seen as intimidating
- health and welfare difficulties and
- additional learning needs not identified early – dyslexia and attention deficit hyperactivity disorder.

Tackling these barriers early would focus on the root of the cause. Scientific evidence is also available which supports the importance of early intervention (Bailey et al., 2014; WLF, 2023). This is due to the brain's high plasticity at this time and the early years being the most formative.

In Scotland, The Children and Young People Scotland Act (2014) increased the funding available to a minimum of six hundred hours per year for all three and four-year-olds in the belief that good quality childcare promotes early learning. This put onus on the ELCC to provide effective early learning.

Children who struggle to learn to read may be at a permanent disadvantage from the start. Stanovich, (1986) referred to this problem and believed that children who initially struggle with reading skills acquire later skills slower than their peers. He termed this 'The Matthew Effect'.

Consistent with 'The Matthew Effect,' barriers to literacy which present early on, persist throughout life; many of these are related to socio-cultural factors. It is important that something is done in Scotland to tackle impoverished vocabulary and paucity of language skills of early years children who may be at risk of failure in literacy learning.

The Ofsted investigation (2011) found the following practices in the most effective early years settings:

- focus on speaking and listening skills
- story-telling
- creation of opportunities to extend vocabulary
- family support – helping parents to help their children
- materials relevant to children (eg army den for army children)
- capturing of children's attention and interest
- commonplace rhymes and songs and
- encouragement of the learning of letter names and sounds.

In schools and post-16 provision the emphasis was on ‘catching up’. A more secure initial foundation may help to prevent children ‘falling behind’ and allowing children to develop a sound foundation at their own pace would leave them better placed to build upon what they know.

1.4 Music in Scotland

Scotland has a strong musical tradition and young and old alike are frequent participators in various musical activities. Many young children are likely to experience, singing, chanting, moving to music, playing of instruments, body percussion, environmental percussion, musical stories and drama in Early Learning and Childcare (ELCC) settings as well as in the community in some areas. This is, however, dependent upon the individuals employed and their confidence to sing or play. Despite being considered as fundamental by many, to language and literacy, there is concern that nursery rhymes may be dying out (Pinnington, 2020) and there is research which states that phonemic awareness is the strongest indicator of literacy proficiency, which has led to the value of syllabification and rhyming (other important phonological awareness skills) to be relegated or at worst, discarded, in place of phonemic awareness practise. If songs, rhymes and stories are not part of preschool, then they are unlikely to be part of formal schooling as movements such as the Science of Reading (SoR) are promoting the importance and superiority of phonemic training, over other aspects of phonological awareness.

Musical activities for young children are available at private sessions offered through some music franchises which offer activities designed to promote musicality, for example ‘Musical Steps’, ‘Monkey Music’, ‘Jo Jingles’ and ‘Kindermusik’. There is also Kindermusik’s ‘ABC Music and Me’ which is designed to promote music, language, literacy and other ELCC skills through music. Others are available to promote dance, such as ‘Babybop’ and ‘Baby Ballet’. Availability of these sessions is more prevalent in city areas than rural ones. Children will also experience musical activities in ELCC settings as music, dance and drama are part of the ‘Expressive Arts’ curriculum area. Musical activities are often part of other community activities such as swimming, ‘Tumble Tots’ and ‘Baby Sensory’, activities for young children. As these activities are privately run, they require payment, which may preclude access to lower income families. Such sessions were also closed during the COVID-19 pandemic.

Creative Scotland, a public body which supports the arts, currently funds the Youth Music Initiative: Access to Music Making fund (YMI) in Scotland. The YMI aims to address the needs of disadvantaged young people (0-25 years) by providing access to high quality music provision for them. In addition to encouraging young people to develop music making skills, ‘Access to Music Making’ also intends to help people to build confidence, self-esteem and positive behaviours and to increase awareness of and encourage progression to further personal development opportunities.

Creative Scotland has also funded the inclusion of Kodály music sessions throughout primary schools in Aberdeenshire with the aim of encouraging more

children to make music and with teacher training to enable teachers to incorporate music into their curricula. In 1969 Kokas recorded improvements in reading in a normal school population in Hungary after introducing the Kodály system of teaching music (based on listening and singing, into the curriculum. Nutkins et al., (2013) reported how such a methodology can aid language acquisition and other developmental areas. Whilst the prime aim of Kodály music is musicality, it is acknowledged that many other curricular areas may benefit from the music sessions.

In 'The Early Years Evidence Review' (Lonie, 2010:3), Lonie acknowledged research showing *'how music making in the early years can lead to improvements in phonological awareness and brain development that has been linked to improvements in reading and language skills.*' However, he pointed to a lack of research articles claiming to definitely prove transfer effects. He also referred to the work of Malloch and Trevarthen, (2009) on 'communicative musicality' to possibly reconsider traditional approaches to the 'delivery' of early years music if musicality is present from birth and intrinsic to communication. Lonie questioned the need for music to be 'delivered' to children if it is already present, suggesting that a child's inherent musicality could be better utilised.

Scotland has a long tradition of folk music, including singing and particularly the playing of fiddles and bagpipes and much is done to ensure that this continues. Instrumental tuition is provided and subsidised by the local authorities

throughout Scottish schools. The richness of musical history embedded in Scottish culture offers a great source of material for language, literacy and music education.

The Scottish traditional music culture is kept alive by actions such as those by the fiddler James Alexander in Moray, who was instrumental in setting up traditional fiddle exams up to Grade Five, offered by the Royal Conservatoire of Scotland (RCS) as opposed to classical violin exams and the inauguration of a local music festival (Speyfest) where young performers are encouraged to take to the stage.

Whilst children cannot learn to read and write from birth, they can undertake and benefit from musical activities. This research seeks to identify areas of commonality and mutual benefit between music and early literacy learning. Given the commitment of Scotland to improve literacy and the wide range of music in evidence and its musical heritage, it would seem prudent to conflate the two for possible mutual benefit and especially literacy.

1.5 The Significance of the Early Years

A child's early years are the most formative. For this reason, this research focusses on the age range between three and five years as this is a time when brain development is highly active (Eliot, 2000) indicating this as a crucial period in a child's life when intervention can make a significant difference. It is a time also given importance by Fröebel (1895b) as providing the foundation for the rest of life.

Scottish Government legislation advocates early intervention. A major proposal for Scotland in The Children and Young People Act, 2014 was for Scotland to be the best place for children to grow up. The Early Years Framework Scotland (EYFS) Scottish Government, (2009a:7) states:

> *'The Millennium Cohort Study provided evidence of significant inequalities in development at age 3 that can persist throughout people's lives. Supporting parents to provide a stimulating and supportive home environment, particularly in the early years, combined with high quality pre-school and school education is therefore a key element in delivering solidarity and cohesion and improving participation and productivity within the Scottish economy.'*

This study identifies age three years as significant and indicates that supporting parents and providing high quality ELCC settings could impact upon future educational development.

Sosu and, Ellis, (2014) refer to the 'attainment gap' and that children need solid foundations in early language and emergent literacy skills. (Tickell, 2011) also supports this view that children who have poor language skills and low-level pre-literacy skills are likely to be left behind.

Further evidence from 'Building the Ambition' (Scottish Government 2014:12) states: '*the more cognitive stimulation a child gets around the age of 4, the more developed the parts of their brains dedicated to language and cognition will be decades ahead'.* Hence, the ages of three to five years are those when the brain is highly susceptible to learning.

Corriveau, et al. (2010) also stressed the importance of identifying areas of difficulty prior to kindergarten (age five). They cited evidence to suggest that children who struggle to learn to read in primary school will continue to have reading difficulties throughout their school lives. Their research which examined auditory processing and early literacy skills was carried out on three-to six-year-old children. They found that children who entered school with little pre-reading skills, phonological awareness and receptive vocabulary, were at a disadvantage. In 2016, Patscheke et al. found that musical training (singing, dancing, drumming, rhythmic exercises, meter execution, playful familiarisation with intervals and training of rudimentary notation skills) had a positive effect on the phonological awareness of children of immigrant families, compared to a physical education program, suggestive that such activities would be advantageous.

Scientific evidence is also available which supports the importance of early intervention (Bailey et al., 2014). This is due to the brain's high plasticity at this time. It would therefore seem remiss at best to undervalue the role of music in a young child's early learning.

Whether we are born with musical ability or not is an area of contention. There is evidence to suggest that humans have an innate musicality (Blumenfeld and Eisenfield, 2006, Winkler, 2009 and Malloch and Trevarthen, 2009). There is also evidence that there might be a sensitive period for music skill acquisition before the age of seven years (Penhune, 2011). As musicians show superior auditory functions to non-musicians this has inspired researchers to search for explanations for this.

Strait et al. (2012) believe that it is music training and not genetics or predisposition to music which is the cause of the strengthening of the auditory cognitive-function and believe that these enhancements are for the same neural function as that for language skills. Whilst genetics is responsible for some degree of ability this does not attenuate the evidence of the positive impact of the undertaking of musical activities upon the brain. These findings add to those of Norton, et al., (2005) who found no pre-existing neural, cognitive, motor or musical differences between children aged five to seven years old who were starting instrumental (piano or string) lessons and a matched group of children who were not starting instrumental lessons.

It seems crucial that steps are taken in the years before children start the formal process of learning to read and write to ensure they have the basic skills, knowledge and experience to progress satisfactorily once they begin formal education. Whilst some children may be 'ready' for formal and explicit literacy teaching, others are not. The CfE promotes early learning as a seamless process, yet children usually physically move from nursery to school, from an informal to formal setting, and where the formal process of teaching reading begins.

Education curricula should be cognisant of this disparity in 'readiness' in order that every child's needs are met. A campaign to create a kindergarten stage for children aged three to seven years in Scotland, 'Upstart Scotland' is currently underway, as its members believe that the current system does not adequately accommodate children who are not ready to begin formal instruction.

1.6 Music as Play

It is not an aim of this research to discuss the role of play in education, but the researcher wishes to acknowledge the importance of play and propose that musical activities are a form of play through which learning may take place. Brandt et al. (2012:3) suggest that music could be defined as '*creative play with sound*'. Zachariou and Whitebread, (2015:119) in their exploration of musical play on self-regulatory behaviours during musical play sessions, refer to the term 'musical play' and suggest that it may include '*handclapping games, circle games, movement play and instrumental play*.' They also point to compelling evidence that guided play (such as in a structured music session led by a teacher) is *'a vital catalyst for intellectual, emotional, social, moral, motor and linguistic development'* (p121). It is this type of musical play which this research aims to investigate. Other evidence shows that young children engage in music as play (Moorhead and Pond, 1978, and Neelly, 2001). Children enjoy playing with sound, making and moving to sounds. Children readily join in with musical activities which offer an ideal medium for learning through play. Fröebel's philosophy included the use of musical play to support learning as mother and child songs and as the child grew older, group songs and games, combined with activity.

Vygotskyian social-constructivist theory propounds the idea of supported play, such that adults scaffold a child's learning until they are able to perform an activity independently. This is a paradigm within which this research is framed. Music and language are areas in where play may be supported for mutual benefit with

subsequent effects upon literacy. The Early Years Curriculum in Scotland has a literacy outcome 'LIT 0-01a' (Scottish Government, 2017b) of *'I enjoy exploring and playing with the patterns and sounds of language'*. Also, as a music outcome the curriculum suggests '*playing with sound and rhythm*,' 'EXA 0-17a' (Scottish Government, 2017b). 'Playing with sounds' is a part of both the literacy and expressive arts curricula. These areas integrate well to achieve both outcomes simultaneously, learning both language and music through play.

The Early Years Framework, Scottish Government, (2009a:18) states:

> *'Play is central to how children learn, both in terms of cognitive skills and softer skills around relating to other people. It is a fundamental part of children's quality of life and a right enshrined in the UN Convention on the Rights of the Child*.'

In the Play Strategy for Scotland: Our Action Plan, (Scottish Government, 2013:10) play was defined as *'play encompasses children's behaviour which is freely chosen, personally directed and intrinsically motivated*…' Guided or supported play is more appropriate to the type of play which will be used to promote literacy activities in this research rather than the free play identified here.

Dr Stuart Brown, (1999), play researcher and psychiatrist, also supports the concept of play as a vital part of development and purports that the opposite of play is not work, but depression. He suggests that play deprivation in childhood can have disastrous results in adult life. In Finland where their performance on PISA tests for literacy is renowned for its high rating, play is pivotal to early years education. One

of the early years curriculum objectives in Finland is that '*children have a right to learn through play with joy'* (Finnish National Board of Education, 2010). All early years teachers are musically trained and musical activities are interwoven throughout the daily activities. In 2015 the researcher visited a range of early years settings in Finland and was able to observe many class sessions. Whilst observing such sessions it was possible to observe that children were indeed '*learning through play with joy*'. Children were regularly encouraged to sing and move in time with the musical rhythm of songs and music with the teacher and it was a fun and natural learning process. This would align with Malloch and Trevarthen's, (2009) theory of 'Communicative Musicality' which explains how a mother and baby interact vocally in a sing-song way as a natural form of communication.

1.7 Music and Literacy as Supportive Systems

Music and literacy are both communication systems based upon sound and there is evidence that they share neural pathways in the brain (Meyer et al., 2014). As a vehicle for the delivery of a playful, yet educational programme to promote early literacy skills, many of which are dependent on sound, musical activities would seem to be ideal. The commonalities between music, language and literacy learning are such that they could work together to promote early literacy learning. Music is inclusive and accessible to all, from (or even before) birth and as such is an ideal vehicle through which to deliver a literacy curriculum.

There is plentiful evidence of areas of commonality between music and literacy learning; they share many comparative features. However, there is little evidence to establish a causal relationship between them (Hansen et al., 2004). Putkinen et al., (2015) found a causal relationship between musical experience and sound differentiation skills. The ability to differentiate between sounds is important for literacy. This would suggest a possible link between musical experience and literacy. It may be that a particular element of musical experience may influence early literacy skills. Bolduc and Lefebvre, (2012:500) report that, '*No study has clearly established which musical processing skills are related to phonological processing skills.'*

Music can provide an ideal medium for the delivery of language skills. Stansell, (2005) approaches the correlations between music and language from a language perspective and describes them as 'supportive sisters' and 'natural partners.' In his article 'The use of music for learning languages', he explores the role of music in the learning of language and the commonalities between each. Comparisons have been found and correlations made between music and language also by Sloboda, (1989); Brown, (2001); Galliford, (2003); Jordan-DeCarbo, (2006); Moyeda et al., (2006); Patel, (2010); Taylor and Clark, (2006); Sacks, (2008); Piro and Oritz, (2009); Marin, (2009), Kraus and Chandrasekaran, (2010) and Pino et al., (2023). Ludke et al., (2013) found that singing can facilitate foreign language learning. The popular American children's TV show 'Sesame Street' used music as a teaching tool, promoting language and literacy skills and specifically paired music with visual movement to take advantage of music's natural motoric nature (Lesser,

1974). Kearney and Levine (2015) reported a substantial and immediate increase in literacy measures of children aged three and four years of age, who were randomly assigned to have access to the show.

Language skills can subsequently help to develop good literacy skills. The relationship between language and literacy is well established and is reflected in the definitions of literacy presented in this thesis. Children with poor speech and language are at high risk of literacy difficulties (Roulstone et al., 2011). Evidence suggests that by the age of three years, fifty percent of our language is in place and by the age of five years eighty-five percent of it is in place (Scottish Government, Deacon, 2011). This evidence adds further weight to the suggestion that the years between three and five are a good time to conduct an intervention which would boost a child's language and literacy development.

Wisbey, (1980) suggested the use of musical interventions to develop multi-sensory awareness and response to sound in order to prevent reading difficulties. Carson et al., (2013) also suggested that the number of 'at risk' children could be minimised if intervention (such as one to promote phonological awareness) is undertaken before the age of six years; a point also made by Dehaene (2009), who recommended phonological training for 'at-risk' children. Bhide et al., (2013) also showed that a musical intervention could benefit children's literacy skills in children aged six to seven years for children who were poor readers. In 1996 Kolb, proposed the use of musical activities to promote literacy skills. Despite showing that musical activities benefit various aspects of literacy learning the relationship is not

explained. The results of research by Strait et al., (2012) who used musical activities to remediate language-based deficits suggested that musical activities activate the same parts of the brain for language and music which offers one explanation of the relationship between music and language.

Dyslexia is an area of reading disability in which musical activities have been suggested as beneficial. Overy, (2003) proposed that children with dyslexia have difficulty with musical timing skills and that musical interventions may help to remediate deficiency in this skill area.

Using music to support literacy in early learning is not a new concept. In many early childhood education philosophies, music and arts are naturally integrated into the literacy curriculum for example, Fröebel, Montessori, Steiner and Reggio Emilia. The document 'Benchmarks' produced by Education Scotland (2017:5), suggests that children in the Early Level (aged 3-6 years) should '*engage with stories, songs and rhymes.*'

In Scotland, music is not necessarily integral to the curriculum. In ELCC settings, children will have music sessions, as music is part of the CfE but, teachers are not automatically trained in music or to deliver other parts of the curriculum through music. The Speech and Language Service which supports children who struggle with language acquisition does not have any musical element in therapy training either. For comparison, in Finland, where in reading they scored 3rd place whilst the UK scored 10th (of OECD countries) in PISA tests (OECD, 2019), music forms

a '*significant part'* of the Finnish Pre-School Core Curriculum (Finnish National Board of Education, 2010). It is not added to the curriculum but integrated through it. Finland also has optional musical playschools where early music and literacy skills are integrated for early years children.

In the UK, music seems to be always on the periphery of education, viewed as a pleasurable 'add-on' and not an integral or important part of the curriculum. Newspapers regularly report cuts to music provision (Wilkinson, 2010 and Musicians Union, 2023). Ponter, (1999) suggests that '*music should be considered as fundamental to the curriculum as mathematics and reading'* (para 1). Fautley and Murphy (2013:158) also echo this sentiment and state in their blog for the British Journal of Music Education, "*Music is not just peripheral to a good education; it lies at its heart*". Despite the belief of some, that music should be pivotal and integral to the curriculum; this is not reflected in the curriculum in Scotland.

In England, the peripheral nature of music in primary schools can be illustrated by a quote from the Association of Teachers and Lecturers (Webb and Vulliamy, 2007:109):

> *"The lessons encompassed all areas of the curriculum, with the exception of music but with a bias towards literacy."*

It is possible that this is also the case in Scotland, although it is encouraging that the document 'Realising the Ambition' (Education Scotland, 2020:31) suggests,

‘*Give me opportunities to learn about music and dance through encouraging me to explore tunes, rhymes, rhythms, timing, pattern and movement.’*

The frequency and quality of music sessions for early years lies in the proficiency and motivation of individual nursery practitioners, the availability of private provision and the motivation of parents to attend such provision; it is therefore not consistent or equally available to all children.

Brandt et al., (2012) concluded that music merits a central place in the understanding of human development in their argument that music hearing and ability are essential to language acquisition. The importance of music to learning is debated. Besson et al (2011) refer to Pinker’s (1997) comment that ‘*music is useless’* and ‘*could vanish from our species and the rest of our lifestyle would be virtually unchanged’* whilst Claude Levi-Strauss considered that ‘*If we could explain music, we may find the key to human thought’*.

Fawcett, Retired Director of Early Childhood Studies, at the University of Bristol (EarlyArts, Fawcett, 2012:1) suggests that *‘the potential of music in early years’ settings is often unrecognised or at least undervalued’*. This is a sentiment with which the researcher concurs. In the researcher’s experience as a visiting teacher of many early years settings; musical activities in ELCC provision in Scotland appear to be for the purpose of leisure or musicality, and there is little deliberate attempt to use music as a vehicle for learning in other areas. EarlyArts, Fawcett, (2012:11) reported *‘At present many early years’ staff do not, as a general rule, tune*

in to children's everyday musical behaviours and are unaware of their musical potential.' Nutkins et al. (2013:68) also refer to the teaching of music in primary schools and that it is perhaps perceived to be the most difficult subject to teach. It is therefore possibly, the most likely one to be marginalised.

Musical activities can offer a social and engaging vehicle for many developmental areas, not least language and other early literacy skills. Providing opportunities for children to play with sounds helps them to tune in to the differences between sounds. Children need to differentiate the sounds in language as an early literacy skill as alphabet characters represent the sounds in our language. Evidence suggests that children who are proficient with manipulating language sounds are likely to become good at literacy (Snowling, et al., 2011).

Through delivery of the early years curriculum, early years settings in Scotland incorporate music in their activities. The CfE also promotes 'literacy across the curriculum' suggesting that music and literacy activities could be combined. However, there is no clear directive on how music may be used to help deliver literacy or other areas of the curriculum.

Music has natural appeal to young children. A project conducted by Rhodari, (2008) confirmed the work of a previous study by Logan et al. (1994) which showed that music played to babies in the womb could be recognised after birth. According to Malloch and Trevarthen, (2009), music is a natural method of communication between mothers and young babies. When music and play come together as

‘musical play’ this can create a means of promoting music, language and early literacy skills simultaneously. This idea is the same as used by Fröebel in his creation of the concept of the kindergarten.

As the early years are a developmentally crucial time, language development is a precursor to literacy development and music can be used to support language development it would seem that integrated music and language interventions are a currently untapped and certainly under-utilised resource in early years education.

The relationship between music and literacy is one which has attracted increasing interest over the last thirty years (Douglas and Willatts, (1994); Standley and Hughes, (1997); Butzlaff, (2000); Anvari et al., (2002); Wiggins, (2007); Bolduc, (2008); Forgeard et al., (2008); Schiffmacher, (2009); Kraus and Chandrasekaran, (2010); Strait and Kraus, (2011); Slvec, (2012); Tierney and Kraus, (2013a), Frasher, (2014)), Bolden and Beach (2021), Kertész and Honbolygó (2021) and Pino et al. (2023).

In 1993 Lamb and Gregory, (1993:20), stated that: ‘*Studies enquiring into the relationship between musical perception and reading skill are very limited in number*.’ Their seminal work to examine the relationship between musical sound discrimination and reading and phonemic discrimination and reading led to a growing body of further support of the existence of such relationships.

It has been established that phonological awareness, (Bradley and Bryant, 1983; Stanovich et al., 1984; Adams, 1990; Kozminsky and Kozminsky, 1995 and Anvari et al., 2002) and in particular phonemic awareness (Ehri et al., 2001; Hulme et al., 2002 and Nation and Hulme, 1997) are the most crucial elements in predicting reading/literacy success. This prompted studies of the role of musical aptitude/skills in facilitating phonological and phonemic awareness. Various studies have been conducted to study the relationship between phonological awareness and music - Anvari et al., (2002); Lathroum, (2011); Degé and Schwarzer, (2011); Degé et al., (2015), Slvec, (2012); Hunt, (2012) and phonemic awareness and music – Overy, (2003); Gromko, (2005) and Rubinson, (2010). These studies found a positive relationship in that musical activities have a beneficial effect upon PA.

Although interest in this area has increased and research has drawn correlation between music and literacy learning, there seems little to evidence any causal relationship between music and literacy. Hansen et al., (2004:viii) reported similarly that:

> '*We are aware that little empirical research has been done to validate the causal relationships between music and reading literacy*' and also draw this conclusion - *'There does not seem to be any research showing a direct causal relationship between music and the improvement of literacy although there is a growing body of inferential reference (eg Tripney, et al., 2010; Corrigall, Trainor, 2011)'*

In 2011, Strait et al., found that music helped auditory processing and suggested that this might in turn impact upon language and literacy. Research by Putkinen et

al., (2015) established a causal relationship between music and auditory discrimination and attention.

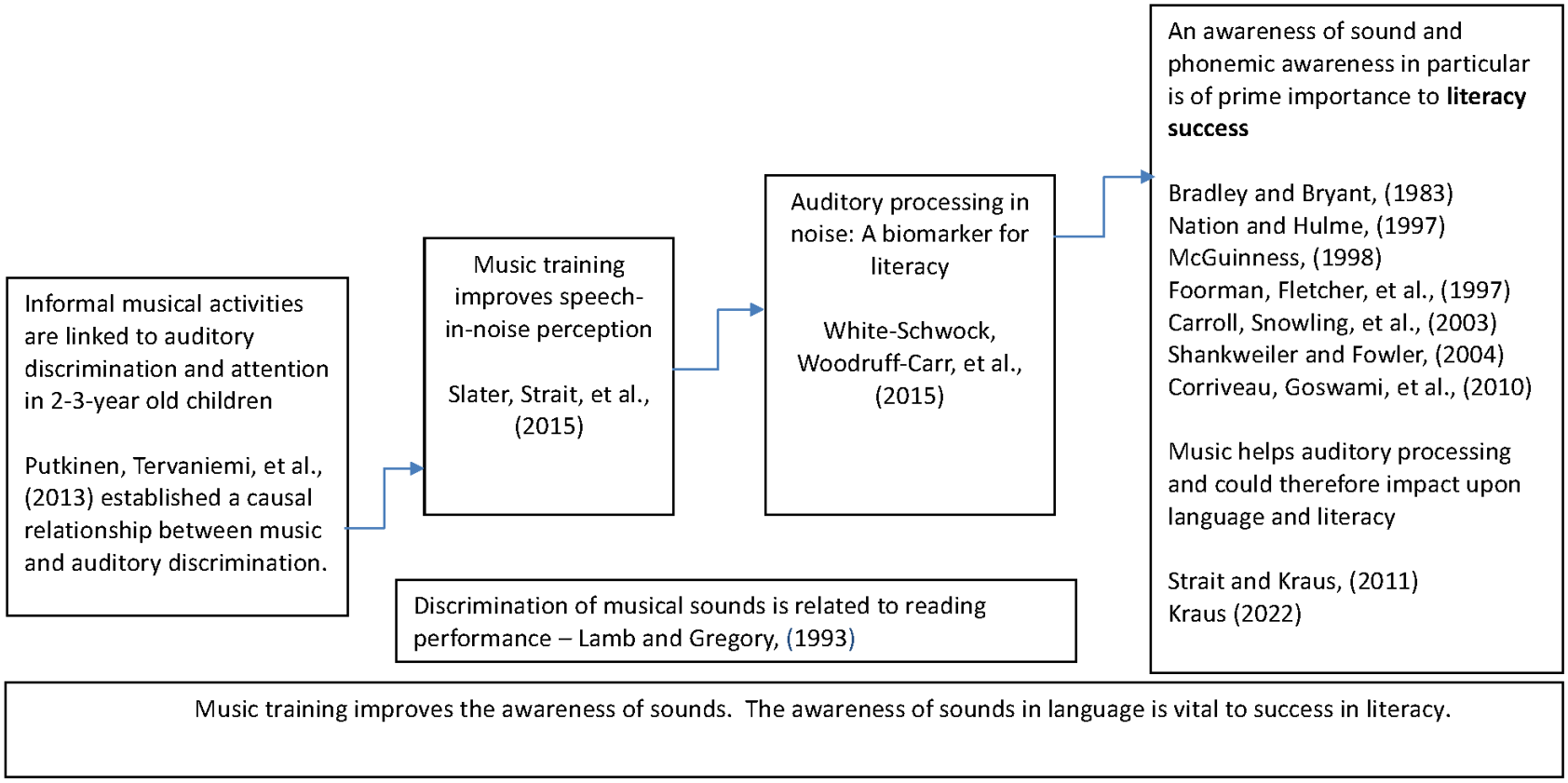
Corriveau et al. (2010) found that auditory rise time sensitivity was important in the development of PA and especially rhyming skills, and White-Schwock et al., (2015) showed that auditory discrimination was an indicator for literacy. However, Partanen et al. (2022) determined that musical perception skills rather than auditory processing skills were associated with better reading ability.

A wealth of extant research would seem to suggest that musical activities must in some way benefit language and literacy learning but how this might happen remains elusive.

The following diagram (Figure 1) illustrates how research supports the suggestion that music training could contribute to literacy proficiency.

Figure 1.

Links between Music Training, Auditory Processing, Phonemic Awareness and Literacy Success



Whilst there is evidence of the relationship, there is little understanding of the relationship between musical training and literacy skill acquisition. Tallal and Gaab, (2006) stated that '*It remains unclear why and how musical training might improve language and literacy skills*.' This lack of understanding of the process may explain the reluctance to explore and exploit the value of musical activities further in terms of deliberate integration with literacy learning. Whilst musicians generally recognise the impact upon literacy as a by-product of their early years provision, this does little to integrate musical activities into early years settings with the specific aim of targeting the promotion of early literacy skills.

Despite the wealth of evidence now supporting the existence of the relationship between music and early literacy, there is much less evidence from studies examining the integration of these two disciplines. Evidence to support such integrated interventions comes from musicology, music therapy, educational psychology and neuroscience. The literature review (Chapter Two) examines the outcomes of integrated interventions to inform the research design of this work.

Whilst research has provided correlational evidence of the impact of undertaking musical activities upon early literacy development, this has been insufficient to cause a shift in curricula design such that an integration of these disciplines is not accidental or reliant upon transference, (suggested by Gromko, 2005) but a significant element of early years provision.

Recent research is beginning to shed light upon why participation in musical activities may positively impact literacy. Holbrook et al. (2022) found that participation in a musical after-school program (The Harmony Project, in the USA), improved language scores due to the improvement in language related brain function in elementary school students. Language related brain function underlies the achievement gap (Horowitz and Samuels, 2017). Kraus et al. (2014) found that musical participation in community projects, can offer neural and academic benefits for children from auditory impoverished environments, which lead to risk of academic failure, by providing auditory enrichment. Participants who were more engaged in the Harmony Project showed stronger encoding of speech and greater increases in reading scores then those less engaged.

This research aims to illuminate the process of early literacy development through the integration of musical activities. This should enable educators to have a greater understanding of the synergistic blending of music and literacy learning. This in turn should facilitate the development of musically enriched early literacy programmes which, whilst appearing recreational for children have educational purpose and focus.

Based on the findings of the literature review, a literacy-through-music intervention was devised for young children aged between three and five years of age, to promote early literacy behaviours and skills. Thereafter, the research sought to examine the relationship between participation in these musical activities and children's early literacy skill acquisition and simultaneous application.

CHAPTER TWO – LITERATURE REVIEW

2.1 Research Context and Framework

This first section explains the context in which the research is situated and the theoretical framework upon which it is based.

The purpose of early years education in Scotland is *'to give children the best start in life'* (Scottish Government, 2009a:10). It aims to do this by striving to provide a safe and nurturing environment for children which supports the development of good physical and mental health, and in which the four capacities – successful learners, confident individuals, responsible citizens and effective contributors - can be promoted. This research seeks to investigate a pedagogy which aims to offer early literacy experiences through musical experience within the context of the Early Years Framework (Scottish Government, 2009a) and which is in accordance with the Government aims for early years education.

The research was conducted at an early years centre in Scotland. The centre was located in data zone 1 (most deprived) on the Scottish Index of Multiple Deprivation. A centre was chosen which is designated as having a high index of deprivation based upon the findings of Sosu and Ellis (2014) that a high percentage (up to 50%) of children in such areas have low language abilities and as a consequence are not progressing effectively in literacy acquisition. Evidence suggests that by the age of three years, 50% of our language is in place and by the age of five years 85% of it is in place (Scottish Government, Deacon, 2011). This evidence would suggest that

the years between three and five are a good time to conduct an intervention which would boost a child's language development, hence the participants in this research were in this age range.

The methods and principles of Fredrick Fröebel will be applied to this research. Fröebel (1826:2) recognised the importance of early education. He believed that education begins at birth and viewed the purpose of education as being '*to encourage and guide man as a conscious, thinking and perceiving being*.' Fröebel's philosophy was based on four principles: free self-expression, creativity, social participation and motor expression. He determined that activities should be goal-oriented and have sense, meaning and purpose for the children. He also advocated that education should be joyous and he used music as a vehicle for teaching. Fröebel was also a proponent of learning through play and is quoted in the document 'Realising the ambition: Being Me (Scottish Government, 2020:44) "*play at this time in not trivial, it is highly serious and of deep significance."* Learning through play is strongly encouraged in the early years' curriculum.

The researcher believes that children learn from their environment and the people and objects within it. Vygotsky (1978) and Bruner (1966) proposed that children learn from their surroundings and the other people in them. The features of Bruner's theory of instruction are incorporated in the intervention design – the belief that structure facilitates comprehension, learning builds on prior knowledge which should be revisited regularly, the content should be interesting and therefore

motivational for the children and children should be encouraged to think. These are values promoted by Fröebel too.

Most of the research to date which draws comparison between music and literacy learning has been quantitative. Various aspects of musical training and literacy outcomes have been correlated. This study aims to offer a different perspective of the relationship between musical participation and literacy learning through observation to further the understanding of the process as well as the outcome. The research will therefore examine the interactions between the child, the activities, the objects (props), the practitioner (in this case the researcher), other adults, the other children and the environment and seek to document and analyse the observations to provide further insight into why there is such a correlation.

The study was undertaken in a natural setting – the early years centre; this enabled children to be observed in surroundings with which they were familiar. The design was flexible and able to change in response to what was happening in the study.

This research aimed to further the understanding of the relationship between early musical activities and early literacy learning by the undertaking of a qualitative, ethnographic study which sought to examine the learning process. Pink (2001:18) defined ethnography as '*an approach to experiencing, interpreting and representing culture and society that informs and is informed by sets of different disciplinary agendas and theoretical principles.'* This inquiry investigated relationships not only between individuals and curriculum content but between individuals, objects,

environment and sensory stimuli; it thus aimed to account for the sensory nature of human experience and knowledge. The research was conducted via a 'literacy-through-music' intervention according to the 'embedded-explicit model' of literacy intervention design from Justice and Kaderavek, (2004). The use of video allowed the intervention to be reviewed at a later date and obviated the need for immediate review. It is acknowledged that researcher interpretation of video footage could be subjective. To overcome this, the researcher transcribed the video and thus documented what could be seen and heard. This transcription was subsequently analysed.

An interpretivist paradigm was adopted by the researcher, having the belief that reality as perceived by a person is constructed through the meanings and understandings which are developed socially and experientially. Reality is subjective. The central endeavour in the interpretivist paradigm is to '*to understand the subjective world of human experience'* (Cohen et al., 2011:17). It is based upon ontological assumptions that reality is subjective and subject to multiple perspectives and epistemological assumptions that knowledge is gained inductively (bottom-up), that knowledge arises from particular situations and that knowledge is gained through personal experience. These beliefs inform the methodology as using an interpretative approach relies predominantly on naturalistic methods such as observation and interview. These methods helped the researcher to construct a meaningful reality through engagement with those involved in the research. The researcher and respondents engaged to further understanding of the social world through a dialectical process.

Where positivism involves the researcher searching for a cause of an outcome - such as in the experiments conducted so far where correlation has been found between music and literacy - an interpretivist approach in education examines how teachers and learners seek to construct meaning from experience. An interpretivist approach is one which adopts naturalistic methods such as action research, observation, interviews and questioning. Observation was used in this enquiry to obtain data.

The research is underpinned by social constructivist and social constructionism views of the world. Key assumptions of these views are that children learn through observation and experience. Constructionism describes how knowledge is based on observation of what we see and acknowledges culture as a determinant of how one views the world; knowledge is constructed from our experience and not just observance of the world but gained through social interaction through engagement with others (Burr, 2015); whilst constructivism explains how children construct their own systems of knowing from their view of the world. This research examines how the experience of integrated musical and literacy activities may help children to construct their literacy knowledge as learning is building upon prior knowledge and experience, as propounded by Bruner (1966).

2.2 Becoming Literate – A Multiplicity of Skills, Knowledge and Experience

This second section aims to define literacy and seeks to examine how children become literate.

The definition of literacy from the CfE (Scottish Government, 2017a) cited earlier on page 11, draws together language and text and highlights the close relationship between language and literacy, as text is written language. The 'set of skills' referred to is not explicitly defined but is integrated in the descriptions of experiences and outcomes in the curriculum. The skills are promoted through the experiences of the child. The standards of attainment expected are specified at each curriculum level in the document 'Benchmarks, Literacy and English' (Education Scotland, 2017).

If literacy involved simply the acquisition of a clearly defined set of skills it would seem a relatively simple task to teach all children to read and write. This does not seem however, to be the case (Ehri, 2005). Whilst literacy includes reading and writing, the ability to read is researched more than the ability to write. This research examines activities which create foundations for both.

Much research with regards to literacy revolves around how children should be taught to read and write, with no universally agreed solution. Theorists and researchers continue to argue which individual variable is more important than another and to solve the mystery of why some children struggle with this process and others appear to learn very easily. Nag and Snowling, (2013:2) suggest that:

> '*Reading draws upon multiple cognitive and linguistic domains in complex ways'* and that '*a comprehensive theoretical account about reading development remains elusive*'.

The ability to read and write is a product of a multiplicity of skills, knowledge and experience. However, the focus often remains upon the teaching of decoding as

this task is pivotal, it is not though enough for literacy proficiency. As formal literacy learning begins at school entry, teachers usually begin with the introduction of text in various ways.

2.2.1 Teaching Reading

Until the 1970s, phonics was the preferred method of teaching children to read in British schools. This involved teaching children how to match language and letter sounds and the 'sounding out' of words. Thereafter, the 'look, say' (whole word) approach took over and children also used the context of a story to help illuminate meaning. Children built a reading vocabulary by the use of 'flash cards.' As not all words are spelled phonetically and children initially learn to read more words more quickly than by decoding, this method was thought to be preferable. Children initially see words as pictures – consistent with Bruner's' iconic representation' stage and learn more quickly to recognise whole words than they do individual parts. However, this process is short-lived, as there is a limit to how many words a person can learn by sight. Once the alphabetic coding system is mastered, the number of words which may be read and written becomes much greater.

After a period of the 'Real Book' approach in the 1980s where children were to be inspired to read exciting texts and effectively guess many words, literacy standards declined in the 1990s and there began to be a return to systematic phonics. The Literacy Hour was introduced in 1996-1999. It included whole class reading or writing, whole class word and sentence level work, including phonics and spelling

and group activities. A report published in 2004 (Machin and McNally, 2008) found a positive and significant effect resulting from the implementation of the literacy hour. Advice from the Rose Review of 2007 (DfE, Rose, 2006:14) was that '*The best route for children to become fluent and independent readers lies in securing phonics as the prime approach to decoding unfamiliar words.*'

The two main approaches to teaching the alphabetic principle are synthetic phonics (the teaching of letter sounds followed by the subsequent blending of sounds to make words) and analytic phonics (teaching starts at the whole word level, with a look and say approach, the letter sounds are taught in the order of initial sounds, then final sounds and then medial sounds). A synthetic phonics programme, an analytic phonic programme and an analytic phonics programme that included a substantial PA element were compared in the Scottish, Clackmannanshire Study, a seven-year longitudinal study by Johnston and Watson, (2004). At the end of sixteen weeks, children in the synthetic phonics group were seven months and more ahead in reading and writing than the other two groups. Word reading gains continued; at the end of P7 the synthetics group were three years six months ahead of their chronological age. Gains in spelling showed children one year and nine months ahead of their chronological age. Thus, synthetic phonics is now the preferred method of teaching children to read. Although in synthetic phonics children learn to put small parts of a word together, they need to be aware of how to break down the sounds in a word – large to small first. To present children with letters when they have little idea of where they belong is like giving a child jigsaw

pieces without the picture and hoping that they will fit the pieces together. Learning also needs to be relevant for the child and activities need to be put into context.

As a result of the Scottish, Clackmannanshire Study, synthetic phonics was adopted as the recommended method of phonics teaching. The CfE also advocated additional strategies of sight words and context clues:

> *'I can use my knowledge of sight vocabulary, phonics, context clues, punctuation and grammar to read with understanding and expression.* ENG 1-12a (Scottish Government, 2017b:8)

Reading schemes are left to the discretion of the teacher or school.

The process of skill development outlined so far suggests that becoming literate is dependent largely on coding skills, suggesting that literacy is a cognitive learning process. There is however, much more to the definition of literacy, what it might mean to be literate and the knowledge, skills and experience required to become literate.

2.2.2 Literacy Proficiency Requires More than Decoding Skills

An alternative lens through which to view the process of learning to read, write and comprehend text is as a socio-cultural process. According to Langer (1991:13) this would enable literacy to be viewed as *'the act of reading and writing as ways of thinking'.* A socio-cultural view explains the process of becoming literate and what it means to be literate, rather than offering a definition of what literacy is. For

example, it is important for a child to recognise what text looks like, to know that it confers meaning and to have the desire to determine its meaning.

Becoming literate is a process which is rooted in a child's early experiences with language and text. The LAP (Scottish Government, 2010:3) recognises that '*Literacy development starts from birth'*. This refers to the fact that children are becoming literate as soon as they are born. The people in a child's environment therefore have an important role in helping to promote a child's early learning. Children may engage with a range of texts early in life, their attention may be drawn to symbols, environmental print, story books, rhyme books, song books, leaflets, text on TV or on other media players and any other text a parent or carer may consider suitable material for children to share with them.

Bandura's theory suggests that children imitate that which they observe, therefore families who regularly read stories to children, sing songs, stimulate imagination, and live in a print-rich environment are likely to have children who imitate these same behaviours and assimilate knowledge about print. Through repeated experience children become skilled practitioners of community activities (John-Steiner and Mahn, 2011). Becoming literate involves children seeing themselves as readers and writers and therefrom being motivated to understand print (Moje and Lewis, 2007).

Through a socio-cultural lens, literacy is viewed as a social practice based upon language (Perry, 2012). The language a person uses serves to define them in terms

of where they come from. It infers their origin in terms of geographical location. It enables understanding between social groups from the same location. Culture also influences what people will speak about, and how they understand their world, thereby influencing vocabulary. People speak about what they do and how they feel. In Scotland the variety of accents and dialects serve to identify people from the many different parts of the country. Location may relate to social class and contribute to a person's self-identity, giving a sense of community and of belonging. This sense of belonging may influence an individual's thoughts and behaviours reflective of their social and cultural origins.

Fröebel (1895b), the founder of the kindergarten stage of education, advocated learning through play, which was purposeful and relevant to the child, in the context of everyday activities. He also used music as a medium through which to teach children about the world and to draw their attention to the sounds and patterns in language. Becoming aware of the sounds in language is vital to literacy success because these sounds then map to graphic symbols (alphabetic characters) as children learn to decode and encode text. Becoming literate requires the building of skills within practices which become almost a natural part of being and feeling.

Whilst the importance of speaking and listening are recognised as important early experiences between a child and its parents; it may also be worth considering the physical communication between them and how this may impact upon a child's early perceptions. The singing of lullabies whilst helping to forge emotional and

social attachment may be accompanied by the cuddling or rocking of a child. Musical experience may be as much a physical one as sound related.

With reference to the work of Lakoff and Johnson (1980,) the way children are spoken to and metaphors which may be used, help to inform children's opinions and also their own vocabulary. It is important for teachers to be aware of their use of metaphor and descriptive language and the impact it may have upon how children see themselves and the world. For example, when speaking to boys or girls differing words are often used. A boy may favourably be described as 'big and strong' whilst a girl is more likely to be favourably described as 'sweet and pretty', thus defining gender roles through socially and culturally defined descriptions and how society perceives they should be.

Inspired from the seminal works of phenomenologists, Husserl, Heidegger and Merleau-Ponty on embodiment, it is recognised that the body is an integral part of the cognitive process. The term 'embodied cognition' implies that the mind is influenced by the body as well as the body being influenced by the mind. This therefore explains how movement of the body may impact the mind and may subsequently impact learning. Tomporowski, et al., (2011) suggested that regular exercise alters brain functions that underlie cognition and behaviour which could explain support for a program such as McClelland's 'Move4Words', literacy support program, McClelland et al. (2014), which aims to improve concentration and subsequent reading ability for children aged seven to thirteen years of age.

A person's values are also reflective of their socio-cultural background. For example, there are some travelling people in Scotland whose practice it is for the boys in the families to become proficient in numerical skills whilst girls are to become proficient in literacy. There is clear delineation of tasks in the family and this social practice affects how the children in these families view various aspects of learning and what they value as important or not. What is relevant for one child may not be relevant for another. ELCC practitioners need to be aware of the home lives of children in order to be able to reinforce common values and plan effective learning opportunities.

The extent to which literacy may be seen as a social practice was discussed by Perry (2012). She wrote of the influence of Street's (1985) theory which contrasted 'autonomous' models of literacy, where literacy is viewed as a set of neutral decontextualized skills; and one which Perry considers to be the model under which formal education operates, and 'ideological' models where literacy is viewed as a set of practices (as opposed to skills) that are grounded in specific contexts. This ideological model is one where literacy practices are interwoven into the wider practices of talk, interaction, values and beliefs. From a socio-cultural perspective the definition of literacy is more about what is done with literacy than what it is (Perry, 2012). In relation to ELCC children this may include being read to, a child's own early attempts at reading and writing, singing, dancing, reciting rhymes, music and sound making, speaking often, drawing, listening, being listened to, sharing literacy practices in the home, sharing activities, socialising, finding out about the world and being encouraged to communicate in a variety of ways. This myriad of

experiences is not sequential, although there is a developmental progression; but serves to contribute to the building of a secure foundation for becoming literate.

Children can learn skills by observing the skills being performed and being helped in stages to perform them for themselves by provision of supported activities in the zpne of proximal development (ZPD) – scaffolded - as per Vygotsky (1978:86). Bruner (1966) suggested that learning is staged (as did Piaget, 1952). Conversely, Egan and Gajdamaschko (2003) stated that Vygotsky suggested that literacy learning is not staged but is initiated through provision of exciting activities. This thinking aligns with Bandura's 'mediational process' of 'motivation' and 'attention'. Children need to be motivated towards and have their attention drawn to what they need to learn.

It is possible to notice when young children are showing early literacy awareness. They may choose books to look at, show preference for particular pictures, or be aware of a story in a book. They may begin to notice environmental print or symbols, want books read to them or begin to scribble with writing or painting implements. Children will learn about concepts of print – book handling and orientation, that print carries meaning, directionality of print and that print can be divided into various segments – pages, paragraphs, sentences, words and letters. Learning about the sounds in words is important. Through musical activities children may learn to tap out syllables, identify and match rhymes and learn alliterative jingles. Many rhymes and songs tell stories and work with these may be extended to offer further literacy activities. Drawing children's attention to variations in musical sounds may help to

develop their auditory focus which can help them to attend to sounds in words too. Musical activities can offer practise in communication and elongating sounds in words in songs can be particularly helpful for any children who struggle to hear such sounds.

It is important that early literacy activities form a basis for future learning. Before children are presented with the learning of letters, they need to know how these shapes represent sounds from words. Many children are aware of letters before they begin school. They may have magnetic letters, alphabet books, words around their environment and be shown how they go together to make words. This may be undertaken in the home or early educational setting. Some children do not have this experience and are therefore unable to situate literacy learning in any context.

Perry (2012) and Sénéchal et al. (2001) both refer to the need for socio-cultural processes and cognitive skill development but identify them differently. Perry (2012) suggests that children require a range of literacy knowledge – lexico-syntactic and graphophonic (vocabulary, syntax ability to decode and encode); cultural knowledge (beliefs, values and expectations) and written genre knowledge (text, features, purposes, uses and organisation). This involves both behaviour and cognitive skills. Sénéchal et al. (2001) also acknowledged that socio-cultural processes and cognitive skill development both contribute to literacy learning and proposed a developmental model comprising of children's conceptual knowledge (knowledge about reading and writing and themselves as readers and writers) and early procedural knowledge (knowledge of letters and words) of reading and writing.

This model also involves behaviour and cognitive skills, but knowledge and skills are identified more specifically.

Where skills are decontextualized then it may be difficult for a child to find relevance or purpose in learning. If, as Perry suggests the autonomous model is the one under which formal instruction operates, then some children may arrive at school without the necessary experience to locate these skills within their schema. The provision of a bridge to link skills and context is required. Fröebelian philosophy would seem to offer an integration of the models of Street's theory such that literacy learning could consist of sets of skills or practices which are embedded in context. Whilst it can be seen that a person's society and culture impact greatly upon language and subsequent literacy acquisition, Perry (2012) points out that '*socio-cultural paradigms may be limited in what they can offer instructors who are working with struggling readers*.' Literacy goes beyond the decoding of words on a page, but the ability to decode is an integral part of the process.

It has also been suggested (Egan and Gajdamaschko 2003; Wolf, 2008) that a child cannot simply discover the ability to read and write in the same way that they might discover spoken language, through experience, as was the supposition of the Whole Language Approach of the 1970s and that they require explicit instruction in the mechanics of decoding and encoding. Archer's book on this topic is specifically for special-needs learners, for whom she describes it as 'essential'. She says that explicit instruction is also 'very helpful' for general learners. If children only required explicit instruction, then, in this regard, learning to read would be a cognitive

process. However, the mere encoding and decoding of text does not enable a child to read and comprehend text; this requires an understanding and facility with language. It should also be noted however, that five to twenty percent of children (Grigorenko et al., 2002) do learn to decode without explicit instruction. Described as ‘hyperlexic,’ these children learn to read at around four years of age, without instruction and a high percentage of such children have autism.

A cognitive-psychological way of viewing literacy is not dismissive of the socio-cultural model but complementary to it. It is enabled only due to the influence of social and cultural behaviours, ideas and values. Literacy is not only a matter of decoding, but rather decoding is a necessary part of the literacy process.

This process initially requires the knowledge that this is possible; that a written format of spoken language exists. Without this knowledge, letters and words are merely visual images. Children must learn that the text they see is representative of the language they speak and hear. This requires exposure to and experience of language and text.

Understanding comes from engagement with the world, as a being in the world and the bringing of experience to formulate perception about actions and objects, (Stolz, 2015). Egan and Gajdamaschko (2003) suggest that we may not require previous knowledge in order to construct new knowledge and that by invoking imagination it is possible to imagine what we do not already know. Whether or not imagination occurs as a result of piecing together bits of what we already know or whether it is

unique creation is questionable. It is possible to experience in our imagination that which we have not experienced in reality. By going beyond what we know we may foster creativity to '*think beyond*', an idea also considered by Wolf (2008:229). Such knowledge of the world and ability to be creative, facilitates the reading process as knowing about what is being read, eases the process, and also fosters the ability to put thoughts to paper.

Neither exposure to text nor learning the mechanics of coding, are sufficient alone to support effective literacy development, both are required. Additionally, as text is written language, then proficiency in oral language is prerequisite to literacy. As alluded to in the introduction, poor language skills are predictive of poor literacy performance and can be a result of socio-cultural influence. '*Language is itself a key aspect of our culture'* p1 (Scottish Government, 2017a:1).

Much research focusses upon reading instruction, as it is this, that is most informative to teachers of reading. Dehaene (2009) explains how the brain processes text and that there are two parallel processing routes, one is phonological (converting letters to speech) and the other is lexical (accessing word meanings). He states, '*Preschoolers benefit from playing with words and their component sounds (syllables, rhymes and phonemes)*' (Dehaene, 2009:228) and describes this as a preparatory stage.

It seems that there is a wealth of experience, skill development and knowledge required, prior to the teaching of decoding and encoding text, upon which the formal

process of learning to read and write builds. This is where the focus of this research lies, in the period prior to formal literacy teaching and learning, one which is ascribed by the researcher to be foundational.

2.2.3 Emergent Literacy versus Reading Readiness

This research does not intend to investigate the formal teaching of literacy as is undertaken upon school entry but to investigate how the factors which lead to literacy success can best be addressed to ensure that secure foundations for such learning may be established. The time prior to formal literacy instruction is often referred to as a stage of 'emergent literacy' and is a time to consider if children are 'ready to read'.

Early literacy skills are developed from birth and in response to the external environment and a person's increasing ability to assimilate, comprehend and interact with this environment and persons in it. This early time of development of skills and knowledge which contribute to literacy proficiency was termed by Clay (1966) as the 'emergent literacy' stage. The term was further developed by Teale and Sulzby, (1986).

Rhyner, (2009:7) explains emergent literacy thus: '*Emergent literacy involves the knowledge, skills and attitudes that begin to develop before, but are related to conventional reading and writing'*. Rhyner confirms that there is no agreement on this exact set of knowledge and skills. The term 'emergent literacy' suggests that

there is no demarcation between pre-literacy and literacy but that the process of becoming literate is a continuum, which is independent of a child's age. It is with the earlier part of this continuum that this research is concerned.

In contrast to the idea of literacy learning being a continuum, the concept of reading readiness was a dominant theory from the 1920s to 1950s suggesting that readiness to read was as a result of biological maturation (Gesell, 1925 in Rohde, 2015). Thus, children began formal literacy instruction when they entered mainstream schooling.

In the late 1950s direct instruction was given to prepare children for formal instruction upon school entry. This is still the case as can be evidenced by the wealth of early literacy publications for early years practitioners and parents and online worksheets for the teaching of the alphabet, as this is seen by many to be the introduction to literacy. Regardless of the stage of the child, children will be introduced to the alphabet upon school entry if not before.

Morphett and Washburne in Morrow (2012:14) suggested that reading instruction should be postponed until the mental age of 6 years 6 months as they considered this to be an appropriate age of maturity. Most other European countries begin formal education at the age of seven years. There is a movement in Scotland which has gathered momentum – Upstart Scotland – which is advocating for the introduction of a kindergarten stage, in line with these countries. Currently, children

begin formal education at the age of four and a half to five and a half depending upon the month of birth and parental choice.

Reading readiness is a skills-based approach in contrast with emergent literacy, reliant upon direct instruction of the alphabetic principle, phonics and phonemic awareness. Activities are prescriptive, drilled and may be tedious and boring. Skills based approaches result in an increase in skills. However, research of the brain and of the learning process advises of a need to focus early learning on language, social, emotional, cognitive and physical development. This is reflected in the current CfE. Chomsky (1965) suggested that literacy should be learnt in the same way as language, in a natural and interesting way which is appealing to the nature of children; explicit instruction is still required but in a developmentally appropriate way. This is also in line with Fröebelian thinking and would seem to offer a more balanced proposal. Children can only connect with learning when they are in a position to do so. Barriers may be developmental, physical or social and many children learn when they are ready, not as determined by a specific age or time in their schooling.

As children in the early years are subject to varying experiences and have varying perceptions it is difficult to identify when they may be ready for formal literacy instruction. As literacy instruction needs to be explicit there is no predetermined time which is perfect for each child rather each child has their own perfect time. It is the teacher or more knowledgeable other (MKO) (Vygotsky, 1978) who should be ready, not the child.

Fröebelian philosophy is reflected in the paradigms of 'sequential developmentalism' and 'individualism'. Sequential developmentalism suggests that there is an ordered sequence of development. A child should move to the next developmental stage when they are ready and not be confined by age (Kwon, 2002). As children bring their varying experiences to learning they may develop in different ways. Each child should be encouraged in their own sequence, adding to what they know, supported in their learning.

The current literacy reports show that not all children are being successful in literacy learning. The introduction of a kindergarten stage would seem to offer more time for children to have moved along the continuum and assimilated more experience, knowledge and skills to have a greater chance of success. Activities through which children can assimilate these would support this success. In the meantime, early years facilities need help to provide as much as they can, to support the building of early literacy foundations.

2.3 Identifying Foundational Knowledge, Skills and Experiences

If early years settings are to establish secure literacy foundations for children, then it is incumbent upon them to have knowledge of the potential mechanisms which underlie literacy skills.

Much of the literature in the area of literacy tends to focus on the process of learning to read and upon reading instruction, rather than on foundational requirements.

However, an understanding of the research serving reading instruction offers a picture of where students are heading. The National Reading Panel (NRP, 2000) investigated the benefits of instruction in phonemic awareness, phonics, fluency and comprehension, vocabulary, and text comprehension. They determined that instruction in phonemic awareness and systematic phonics were important and that students needed the ability to read accurately and fluently and to be able to comprehend what they were reading. While Dehhaene (2009:328) also recommended explicit and early teaching of the correspondence between letters and speech sounds (phonics), he also considered that vocabulary enrichment is equally important to decoding.

The Reading League has founded a body of evidence-based research which focusses on reading instruction - The Science of Reading, (SOR) - and determines that decoding depends on explicit teaching and learning of phonemic awareness and phonics. This is generally the starting point of formal literacy teaching. However, whatever reading instruction is implemented, it will not be successful if children do not have the requisite foundations to facilitate the comprehension and application of this instruction.

The Reading Rope (Scarborough, 2001) sought to link early skills and literacy competency. Scarborough used ‘The Simple View of Reading’ proposed by Gough and Tunmer (1986) – ‘Word Recognition x Language Comprehension = Reading Comprehension’ and identified requirements for word recognition as: phonological awareness, decoding (alphabetic principle and sound to symbol correspondence)

and sight recognition (of familiar words) and requirements for language comprehension as: background knowledge (facts, concepts etc.), vocabulary (breadth, precision, links, etc.), language structures (syntax, semantics etc.), verbal reasoning (inference, metaphor etc.) and literacy knowledge (print concepts, genres, etc.). This is a set of requirements for literacy with which the researcher is in accord.

Topping (2014) conducted a literature search for his government report on literacy appraisal and considered what might be the best predictors of reading ability. He initially identified sixteen components of literacy and early literacy, indicative of the many contributory skills to the literacy process. He discarded 'auditory processing,' as being related to IQ and not therefore able to be changed. Not all short-term memory tests were found to be significant predictors of reading, so memory was discarded. This is not something the researcher can agree with as without the ability to retain auditory and visual information, it would be difficult to learn to read and write. Additionally, the researcher believes that auditory processing and memory retention and recall are able to be improved, and moreover, specifically improved through participation in musical activities. Vocabulary, morphology, fluency, drawing and meta-cognition and self-regulation and self-concept were also regarded as not in Topping's top ten. Lack of attention was identified as an attribute which would contribute to poor reading outcomes.

Letter naming and phonological awareness were found to be highly predictive of reading outcomes. He found word recognition, language comprehension, rapid

naming skills and phonemic decoding to be less predictive but having value and stated that these should be included in any observational assessment. Motivation and persistence, computer assisted assessment, book availability and writing were also found to be predictive of later reading ability. These were therefore cited as his top ten.

Whitehurst and Lonigan (undated) developed an online screening tool, ‘Get Ready to Read’. It assesses print knowledge, linguistic awareness and emergent writing.

The Benchmarks document (Education Scotland, 2017), offers the following benchmarks for Early Level (age 3 to the end of P1 – age 6) for literacy and English:

- Hears and says patterns in words.
- Hears and says rhyming words and generates rhyme from a given word.
- Hears and says the different single sounds made by letters.
- Hears and says letter blends/sounds made by a combination of letters,
- Participates actively in songs, rhymes and stories.
- Chooses a story or other texts for enjoyment, making use of the cover, title, author and/or illustrator.
- Engages with and enjoys watching, reading or listening to different texts, including stories, songs and rhymes and can share likes and dislike.
- Engages with stories and texts in different ways, for example, retelling/-re-enacting stories and/or using puppets/props.

There is no comprehensive list of definitive skills, knowledge or experiences which guide early years' provision.

In addition to factors which may promote literacy learning, there are also barriers which prohibit potential learning (Ofsted report, 2011). These were detailed in the Introduction (pages 20-23) and are referred to later in this chapter. It is interesting to note that the factors which support success are also the same as those which are deficient in learners who are struggling (Shaywitz et al., 2002). This relates to environment, knowledge and skills.

Despite the lack of a definitive list of skills, knowledge or experience which children should have prior to becoming literate, there are areas of skills, knowledge and experience, upon which, researchers do agree, as being requisite for proficiency in literacy (Figure 1) and these are: that language skills are the basis upon which the ability to read and write are built, that phonological awareness (the awareness of sounds within words) is an important link between oral language and written language and that it is important to know how to map the sounds in spoken language to the sounds in written language. There is also acknowledgement that cognition has a major role to play in literacy learning as cognitive ability affects all learning. The CfE (Scottish Government, CfE, 2009b:11) states that '*skills in thinking relate closely to skill in literacy'*. Heath et al. (2014) confirmed that '*phonological awareness, letter knowledge, oral language … are acknowledged within-child predictors of literacy development*' in their abstract. There is also recognition that becoming literate is dependent upon experience of literacy

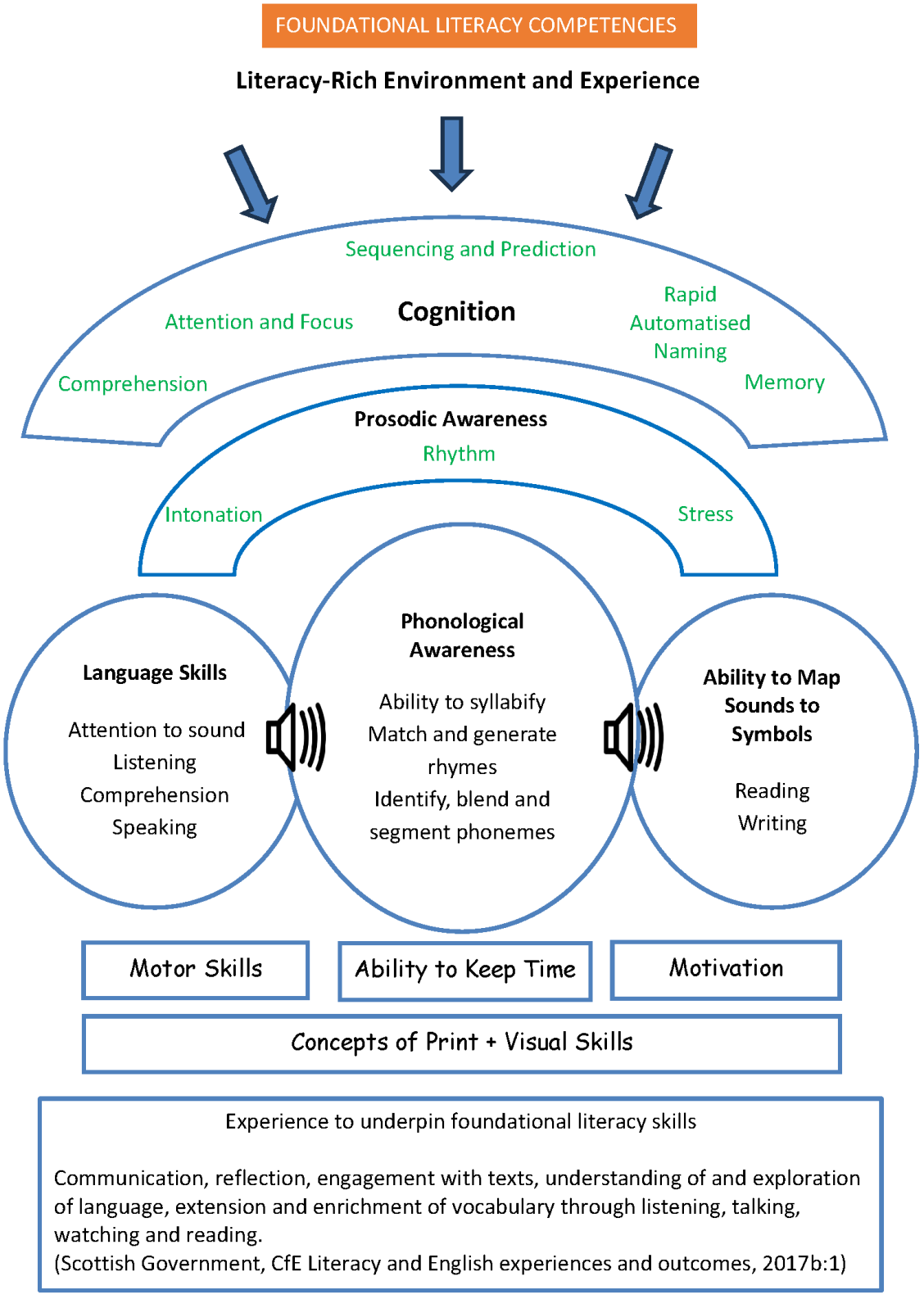
practices and upon motivation to engage with text. The experience required to underpin the development of these skills is identified by the CfE (Scottish Government, 2017b) in Figure 1.

The British Dyslexia Association (BDA, 2024) provides lists of difficulties which children with dyslexia may experience: difficulty paying attention and sitting still, listening to stories, learning nursery rhymes, learning to sing and recite the alphabet, pronunciation (muddles words), following instructions, keeping a simple rhythm and sequencing. Other indicators of dyslexia include, slow speech development, confusion of directional words (up/down; left/right), poor auditory discrimination, poor processing speed, poor motor skills, indeterminate hand preference and easily distracted. Children with dyslexia will present a cluster of these difficulties.

Figure 2 (on page 72) illustrates the experiences, skills and knowledge found to impact literacy success which are often found to be deficient in those who struggle with literacy, and which are present in those who are proficient. Where these factors are in place before children commence formal literacy learning then children stand the best chance of success and have a secure foundation upon which they are able to build further knowledge and skills. Formal literacy learning generally begins with familiarity with the alphabetic code and learning sound to symbol correspondences and as such is not foundational. However, it is included in the diagram as many children begin school with some alphabetic knowledge and this subsequently supports their continued learning.

Figure 2.

Factors Which Are Identified as Present in Children Who Are Competent Literacy Learners and Which Are Often Deficient in Children Who Struggle with Literacy



Although Bruner recommended structured learning in his ‘spiral curriculum’ there should be opportunity to consider a child’s own thinking and opportunity for children to bring their own experience to their learning. Individualism regards each person as their own person; each person should be encouraged to develop at their own preferred rate and cognisance taken of individuals’ strengths and weaknesses. Adherence to sequence should not constrain thinking. There is no sequence to the acquisition of these skills or experiences as children bring their own set of perceptions, values and abilities to their learning. Reasons for the inclusion of each element in the model are detailed below:

2.3.1 Knowledge and Experience

For children to become literate they must have bibliographic knowledge; they must know the correct way to read a book from cover to cover, print direction, the concepts of letters and words and that text has meaning, identified by Strickland and Schickedanz in 2004 as ‘concepts of print.’ In order to gain this knowledge, they must experience literacy practices, through which they will learn how text relates to language.

The impact of the home environment is the first influence upon a child’s learning. Reading aloud to children for example, promotes emergent literacy and language development (Duursma et al., 2008). Where a home environment consists of caring relationships with time spent in conversations, songs, rhymes and stories, a wide range of engaging activities, access to and the reading of books, engagement in

literacy behaviours (reading, writing, drawing), awareness of environmental print and promotion and support of children's development; such exposure forges pathways to fluent reading (Sénéchal and Lefevre, 2002).

Children without such experiences will not begin formal schooling with the same foundations for literacy success as those who have benefited from them. An Ofsted report in 2011 reported that barriers to learning were apparent in socially deprived areas and consisted of problems with speech delay (in one centre visited thirty percent of the children had speech delay, which led to an impoverished vocabulary), circumstances such as being in care, limited experience of life outside of the immediate community and poor attendance. These all impact upon a child's ability to learn.

The attainment gap is the difference in educational performance between those in deprived situations and those in more privileged ones. An explanation for this gap is provided by Chen et al. (2018), who found that Socio-Economic Status (SES) and learning motivation were significantly related to reading ability. They found that the parents with higher education levels provided learning assistance both directly (for example, with homework) and indirectly through their parent-child relationships. This impacted upon the child's motivation and attitude to reading and also reading fluency. Although the study was undertaken in China. they stated that the positive correlation between SES and academic achievement is consistent across races. Children in deprived areas are less likely to have highly educated parents; a

mother's level of education is also predictive of a child's literacy success in first grade (Sucena et al., 2023).

A study in Scotland (Sosu and Schmidt, 2022) on children aged three to five years, found that in an area of social deprivation, when incomes were volatile and increased, then this resulted in gains in children's expressive vocabulary. Conversely, when incomes decreased, children experienced a decline in problem solving ability. The effects of volatility were also the same for medium income households.

It is apparent that for children from families of low socioeconomic status, it is ever more important that any early childcare facility can strive to make up the deficit due to some of the learning barriers that the children may be facing. For example, access to books, cited by Topping (Scottish Government, Topping, 2014) as an indicator of poor literacy is an obvious area to address. Without access to books a child is not able to assimilate bibliographic knowledge. Exposure to books and being read to predicts vocabulary and letter knowledge (Davidse et al., 2011). This confirmed previous research asserting that when children are read to, they may learn about print but most importantly they assimilate vocabulary as the reader is more likely to comment on story content than print concepts.

2.3.2 Cognitive Skills

2.3.2.1 Comprehension

A general comprehension deficit was found to account for reading comprehension difficulties by Stothard and Hulme (1992), indicating that language comprehension is not solely responsible for reading comprehension. Children need to not only understand language but to understand about the world, how things work such as cause and effect and be able to make decisions. Without comprehension there is little purpose to reading or writing.

2.3.2.2 Attention and Focus

Based on previous evidence that problems with attention predate learning problems and the importance of the relationship between attention and literacy, Dice and Schwanenflugel, (2012), tested alphabet awareness, phonological awareness, and receptive and expressive vocabulary as elements of emergent literacy and administered a short version of the BASC test to test attention. Mother's education was noted too. When children were tested in KG on reading ability the results showed that attention in preschool was related to children's ability to decode a year later, with attention being a stronger predictor than maternal education. Where children fail to attend to what is happening around them or to listen when they are being spoken to, then they cannot learn from the experiences in their environment.

2.3.2.3 Sequencing and Prediction

Children need to be able to sequence and order for remembering letter order in words, recalling the alphabet, recalling and forming storylines and predicting what might come next. Sequencing difficulties can be a symptom of dyslexia. There are basic sequences children need to learn, pertaining to time, such as days of the week and months of the year or the scheduling of the school day. Problems with sequencing can be predictive of reading difficulties (Stein, 2022). In a study of 8–11-year-old students, Gouldthorp et al., 2017 found that sequencing ability may also be important for comprehension.

Skilled readers know what is coming next (Cevoli and Rastle, 2022). When a child is good at language, they are able to know what words may possibly and will definitely not be coming next. Being able to predict a word also increases the chances of correct pronunciation (Smith, 1975). For example, when a word might be a noun or a verb as in the case of ‘house’ or might be in past or present tense, as in the example, ‘I read this book last night’ or ‘I will read this book tomorrow’. Although the strategy of guessing words when learning to read, is not encouraged; having an idea of what is to come, helps fluency and comprehension in the same way as pre-teaching vocabulary does.

2.3.2.4 Rapid Automatised Naming

Rapid Automatised Naming (RAN) tests, assess how quickly a person can name a range of familiar items. They are often used in literacy screening, as RAN speed in kindergarten and preschool is correlated with grade school reading (McWeeny et al., 2022; National Early Literacy Panel (NELP), 2008). McWeeny et al. found that alphanumeric tests were better predictors than alphabetic only and that RAN tests predicted real name reading better than non-word reading. They attribute this predictive ability to a combination of cognitive and language abilities such as global processing speed, phonological processing speed, serial visual processing and orthographic access and articulation. The test is akin to 'reading' without the words and can be predictive of reading fluency.

2.3.2.5 Memory

The capacity to remember is integral to learning. Learning is dependent upon memory in that it enables us to retain and recall previous knowledge, skills, experiences and learning.

All memories grow weaker over time but can be strengthened by review, before we forget them (Ebbinghaus, 1913). Spaced repetition is the most effective strategy for memory retention. This technique is often used for learning spellings – review the next few days, then weekly, then monthly, then each year thereafter. Active self retrieval (answering a question) is more effective than being told. Ebbinghaus, in

Roediger III (1985) recommended serial learning as this provided association. He did not refer to chunking, organising or grouping to assist his serial learning, which is now used. Accelerated learning systems such as that of Dryden and Vos (2005) suggest that association helps recall. Using visual images – real or imagined helps to associate the images with what needs to be remembered. Greater associations enable greater memory retention and recall. Hence multi-sensory activities enable a learner to make more associations than a single sense activity.

Building upon what we already know enables new learning. When playing a musical instrument from reading sheet music, for example, it is important to remember how to read and interpret the notes and how make and interpret the sound of those notes with the instrument. When children first learn to read, they must remember what each letter looks like. This entails the ability to match shapes. They must also be able to hold letter sounds in their head and then remember which letter shapes are associated with which language sounds. It is also important that children comprehend the spoken language. They must remember what words mean and how they are sequenced to make a comprehensible sentence. By regular use of vocabulary children develop vocabulary of their own and need to be able to remember it.

Literacy requires both mental and physical skills. When reading aloud a person must move their eyes across and down a page of text, may need to move the mouse of a computer or turn pages of a book. They must remember what to do; which way to follow the text. This becomes habit as children are read to and learn to read for

themselves. Some physical habits form muscle memory and tasks become automatic, such as holding and turning pages of a book.

Ehri, (2005) wrote that competent readers know what a word looks like and do not decode every letter. She proposed that children need to have a visual memory of what letters and words look like. Torgesen and Hudson, (2006) showed that fluent readers can identify words at the same speed as speaking and that the need to decode each word detracts from comprehension of the text being read. Ehri believes that with practice all words come to be read automatically by sight in a process called ‘orthographic mapping’ (Ehri, 2014). Children learn to read most efficiently by first learning to decode words, then recalling the words by sight from memory through repeated exposure and repeated practise at recall. The connection between spelling and pronunciation also bonds to the meaning. Words are then stored in the memory, with spelling, pronunciation and meaning each assisting the subsequent recall. Children must be able to comprehend and enunciate a word as well as be familiar with its orthography for it to be retained in the memory.

Cohen and Squire (1980) drew a distinction between different types of memory for knowing and for doing. They termed memory for actions ‘procedural’ and those for knowing ‘declarative’. Some people are very good at practical tasks but not so good at remembering facts. Procedural memory has also been termed ‘muscle memory’; it refers to actions which require physical activity such as riding a bicycle, playing a musical instrument or writing. As an activity is performed repeatedly, it ceases to require conscious effort. It is therefore important that children are able to recall letter

shapes and produce them in order to write. Where this activity is part of a child's everyday behaviour then they are more likely to learn how to do this activity. For example, children who play at being musicians, drivers, writers or whatever activity they enjoy, are likely to continue this into adulthood. The researcher played at being a teacher when she was young and subsequently became a teacher.

Short term memory enables a person to process information. The information must then be made more permanent if it is to transfer to long term memory. It may be consolidated by repetition, frequent recall or remembered due to its novel effect or a specific desire to remember it. Atkinson and Shiffrin's (1968) multi-store model of short-term memory was extended by Baddeley and Hitch (1974) to develop their working memory model. This model allocated different systems for different types of information. It involved 'attention' to a stimulus. If a person doesn't attend at all to a stimulus then it is unlikely to be remembered. Baddeley and Hitch proposed that acoustic and visual inputs are remembered separately. When learning to read these inputs need to be brought together.

As learning is assimilated from a person's environment it is important that knowledge and skills required can be committed to memory. People remember what is unique; this may be in terms of particular boredom or particular excitement. What becomes repetitive becomes automatic. Once children can write alphabetic characters they do not need to think about every letter, and words can be written fluently. Reagh and Yassa (2014) found in their 'competitive trace theory,' that although repeated experience will strengthen commitment to memory - as found by

Ebbinghaus (1885, translated 1913) - repetition may reduce the ability to remember details of that memory. Familiarity with a place for example, may inhibit ability to recall details about it. Being able to put something in context and relate it to something else assists memory retention. Remembering a sequence of events helps memory recall as each item relates to another. It is also easier to learn something new if it can be linked to previous knowledge (van Kesteren et al., 2014). When asked to recall events from childhood, people frequently remember songs – Alzheimer's patients have been known to recall events when linked to a song. Gathercole and Alloway (2007:12) state that, "*Approximately 70% of children with learning difficulties in reading obtain very low scores on tests of working memory that are rare in children with no special educational needs*."

It is possible that memory may be cultural. Research by Reese et al. (2008), found that Maori adults have the earliest first memories and that this may be due to Maori children experiencing a richer narrative environment than Pakeha (NZ European) mothers for significant events in their past. Mothers frequently share stories about past events. Children learn from what they do.

2.3.3 Prosodic Awareness

Prosodic awareness is the awareness of how speech is spoken, and the message inferred by the tone, rhythm, and stress of the voice. Being able to extract meaning from language is its purpose and such awareness of how a message is delivered may alter its meaning. Prosodic awareness is therefore important to language and

subsequently to reading, as a reader must be able to extract and infer the correct prosody in text to extract the meaning of the writer. Being able to internalise text whilst reading helps reading fluency and reading fluency supports comprehension (Duke and Cartwright, 2021). Of additional note, is that the prosodic features of people in a conversation tend to converge in a process termed prosodic entrainment, which may contribute to social acceptance in a larger group situation.

2.3.3.1 Intonation

Much can be inferred by the tone in a person's voice. For example, one person generally knows when another person is pleased or displeased by the tone of their voice. Another simple example is when a question is inferred from a statement, for example, a person may say '*The bins have been put out'*. Depending upon how this is said, it could be a statement that the bins have been put out, or if there is rising intonation at the end then it could represent the question '*Have the bins been put out?*'

2.3.3.2 Rhythm

Polyanska et al. (2019:1) describe rhythm in speech as '*the structure that determines how the signal is organised and develops over time*.' The rhythm of a sentence may change as different words in it are stressed and its meaning will therefore change, as illustrated in the following paragraph on stress. Pauses in a sentence can change the meaning, depending on where they are placed and help

to indicate that something more poignant or important might be to follow. A long pause in a sentence, may be indicative of reluctance of the speaker, to pose their question for example. Humans have a natural speaking rhythm of three to eight syllables per second. The timing of rhythm is also important, fast speech may indicate urgency; if a person speaks too fast however, then comprehension becomes increasingly difficult, and the meaning may become distorted or lost.

2.3.3.3 Stress

The varying stresses placed upon syllables can change the meaning of words, for example, in the word 'present', dependent upon the stressed syllable, the word may mean to be here (an adjective) or a gift (a noun) or to give something to someone (a verb). Also changing the stress of a word in a sentence will change the rhythm and subsequent meaning. For example, note how the change in the stress of the words in bold, also changes the rhythm and subsequent meaning of the following sentences:

'**He** didn't ride to the park' – someone else possibly did

'He didn't **ride** to the park' – he went to the park but not by riding

'He didn't ride to the **park**' – he rode but not to the park

Hence, sensitivity to prosody in spoken language is imperative to accuracy of comprehension.

2.3.4 Language

As text is encoded language, the ability to read and write is fundamentally dependent upon facility with language. Speech, language and communication are key indicators of literacy competency and difficulties are predictive of literacy difficulties (Snowling and Hulme, 2012) hence, this is an important area of focus when considering early precursors to literacy skill acquisition. Language development at age two years predicts literacy performance (Roulstone et al., 2011). Despite advances in learning about language development, Frey and Sappey-Marnier, (2018) report that teachers are still quite helpless to remedy students' language difficulties.

2.3.4.1 Receptive language

Children must be able to detect speech sound effectively and comprehend what is spoken to them in order to learn to speak themselves. Where children hear a limited number of words, this will impact their own language and subsequent ability to read and write. Similarly, where children do not perceive the sounds they hear effectively, for example if they suffer from 'glue ear' or any hearing impairment, this can affect their speech development. A child's auditory perception impacts their ability to process speech sounds.

Measurements can be made of the timing of speech reception. The measurement of a sound wave from rest to crest is referred to as its amplitude. The changes in

the amplitude of a sound over time is the amplitude envelope. This envelope contains information necessary for successful speech perception – prosody (intonation and stress), speech rate and tonal contrasts. The time for the wave to go from rest to crest is referred to as rise time. Rise time sensitivity is predictive of literacy outcomes in adults with dyslexia (Pasquini et al., 2007) and also children with reading, and reading and language difficulties (Beattie and Manis, 2018). Ultimately, perception of sound impacts greatly upon language perception and subsequently speech.

In order to hear, children must listen and be attentive to sounds. They must be able to hear ‘speech-in-noise’ (Tierney and Kraus, 2013a), for example in a noisy classroom. A child’s ability to attend to and perceive sound is important for their phonological awareness in terms of comprehending what they are hearing.

2.3.4.1.1 The importance of sound processing

The ability of children to be aware of the sounds in words is vital to their ability to learn to match sounds to symbols for reading and writing. Davis, (2019) a Tomatis sound consultant, advises that children must be able to follow sound when it moves (for example, a teacher moving round a room), differentiate between pitches of sound (inability is related to understanding many aspects of speech), and process sound coherently through air and bone conduction. Deficits in this area can impact behaviour, learning and emotional regulation and affect sound and vestibular integration.

The processing by the brain of sound is termed ‘auditory processing’ and one which is required for effective interpretation of the sounds in language. Sound processing matures from ages three to eight years (Thompson et al, 2021). It therefore seems reasonable to assume that not all children are ‘auditorily ready’ to detect the nuances of sound that are required for phonemic awareness. Tallal (2012) refers to Hornickel who links reading failure to auditory processing disorders. Disorders of speech perception are linked to auditory processing speed and such disorders will impact upon language and subsequently literacy learning. Perception of speech will affect a child’s own speech and also maybe comprehension (Tallal, 2004).

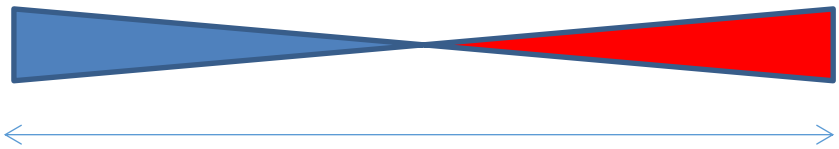
The perception of sound is a skill which develops from global to local (Brady and Shankweiler, 1991, Goswami, 2010). Children are aware of large sound units such as whole words before their perception refines to an awareness of syllables, rhymes and phonemes. The relationship between syllables, rhymes and phonemes in terms of sound perception is a linear one (Brady and Shankweiler, 1991, Corriveau et al., 2010).

Conversely however, the teaching of reading follows a linear progression involving local to global processing of phonological units. Children learn phonemes (the smallest units of sounds in words), then map them to graphemes (their written equivalent) and then learn to blend them together to make words. It is possible that where children have not yet reached the stage of being able to perceive the smaller units of sound in language this may be a cause of difficulty when they are presented with synthetic phonic reading programmes upon school entry. The diagram below

from Kay (2016) illustrates how children's perception of sound may butt together with the beginning of formal literacy instruction.

Figure 3.

Sound Perception Development Fully Developed at the Beginning of Literacy Instruction



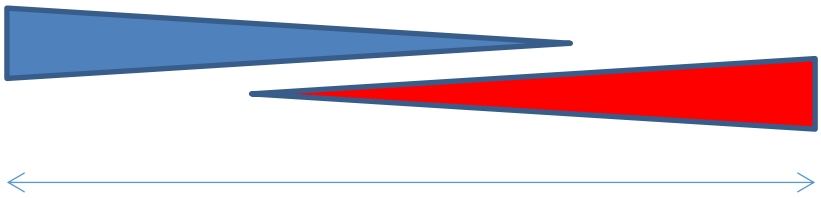
Blue = Sound perception development – large to small units

Red = Formal literacy instruction begins – small to large units

In this case children are able to process small units of sound and are ready to learn individual letter sounds. Where children have not yet developed the ability to process small units of sound, they may be introduced to formal literacy instruction before they are able to comprehend that words are composed of smaller components of sound. This is illustrated by the diagram from Kay (2016) below:

Figure 4.

Sound Perception Development Not Fully Developed at the Beginning of Literacy Instruction



Blue = Sound perception development – large to small units

Red = Formal literacy instruction begins – small to large units

This then creates a gap in children's progression such that comprehension of how word sounds can be broken up into letter sounds may be difficult. An intervention to facilitate the closing of the gap would seem helpful or allowing a longer gap until the child has matured to the point where they are able to process the units of sound necessary for literacy success.

A person's auditory experience can affect their ability to process sound (Kraus and White-Schwoch, 2018). For example, in her research in association the Harmony Project, (Kraus et al., 2014) she found that students who undertook a musical program, subsequently had much stronger language and reading skills, could hear better in challenging environments (such as a playground), had faster brain development and exhibited more accurate responses to sound.

2.3.4.2 Productive/Expressive language

Children learn to speak by listening to and imitating those around them. Language production is the product of the interaction of the child's learning capacities and their language environment (Feldman, 2019). It requires human interaction, and the more words children hear, the more their vocabulary builds. Sensitivity to rise time is indicative of vocabulary; Kalashnikova et al., (2019) tested rise time

discrimination thresholds in infants at age seven and ten months. There was significant correlation between these results and vocabulary at age three years.

Fluency takes practise and children must have the opportunity to practise their language skills and receive positive feedback. Children who are aware of prosody (stress and intonation in speech) become more fluent readers as use of prosody in reading aids comprehension. The ability to comprehend and correctly produce language sounds contribute to the process of orthographic mapping, enabling the brain to match the sounds in a word and its comprehension to its orthographic representation (spelling).

2.3.5 Phonological Awareness

Phonological awareness (PA) - the awareness of the sound components of words - is identified as being of major importance to the process of learning to read (Goswami and Bryant, 1990; Bradley and Bryant, 1983; Stanovich et al., 1984; Adams, 1990; Wagner, et al., 1994; Kozminsky and Kozminsky, 1995; Scarborough, 1998; Snow, et al., 1998; Lonigan, et al., 2000; Anvari et al., 2002; Carroll, et al., 2003).

PA can be identified at three levels:

- the awareness of and ability to identify syllables in a word

- the awareness of and ability to recognise, match and produce rhymes in a word and

- the awareness of and ability to identify and manipulate (add, delete, substitute, blend and segment), the various phonemes (the smallest sound units) within words.

2.3.5.1 Awareness of syllable division and ability to identify syllables

Fröebel (1895a:323) attached importance to the clapping of syllables with the hands which makes the '*audible separation of the word visible on the clapping on the teacher's part and sensible on the clapping on the pupil's part,'* the auditory, visible and physical separation thereby offering a multi-sensory learning experience. Fröebel (1826:70) goes as far to say that:

> *'We rob ourselves as educators, and we still more rob the child as pupil by discontinuing so soon the development of rhythmic movements in early education.'*

The ability to divide multisyllabic words into smaller chunks of sound aids spelling. It also draws children's attention to the sounds within words. Müller et al. (2017), found that improving fourth grade, struggling readers' ability to syllabify 3-syllable words helped them to read single words more accurately.

Syllables in words reflect the rhythm of the spoken language. Ability to detect the rhythm in language is allied to timing; inability to keep time is correlated with

dyslexia. The ability to keep a beat, a possible precursor to syllabification may well be indicative of proficiency in other literacy skills. Bonacina et al., (2021) found that children who performed well on a beat synchronisation task outscored preschool children on preliteracy measures.

2.3.5.2 Rhyme

Awareness of matching sound patterns at the end of words and ability to generate matching rhyming words helps children to identify word families and to match spelling patterns to language sound patterns. Children learn to recognise patterns to build words (Brown et al., 2014). Rhyming activities offer early building blocks for literacy, demonstrating how words and phrases are put together (Zhong and Guo, 2022).

Sensitivity to the intra-syllabic units of onset and rime is one of the phonological factors which contribute to the ability to read. Bryant et al, (1990) showed that sensitivity to alliteration and rhyme at age four to five years contributes to reading and spelling at age seven. Goswami, (2002) regards the ability to rhyme as a positive phonological step in literacy learning, although not as predictive as phonemic awareness and Corriveau et al., (2010:38) describe rhyming skills as '*the most developmentally advanced stage of phonological awareness prior to reading exposure.'* They suggest that ability to rhyme can bolster prereading skills before a child is exposed to reading instruction and potential failure.

2.3.5.3 Phonemic Awareness

Whilst phonological awareness is identified as pivotal (Goswami and Bryant, 1990), to learning to read and write, phonemic awareness is identified as the most important element of phonological awareness (Muter et al., 1997 and Nation and Hulme, 1997) and is identified as 'foundational knowledge' by Ehri (2022). Children who are aware of the individual sounds in words and are able to manipulate them (add, delete, substitute) are better placed to match them to alphabetic characters than children who can't. A phoneme is the smallest unit of sound within a word, and there are forty-four in the English language.

Fey in Scarborough (2001) described phonological awareness as a 'proximal' causal factor in successful literacy outcomes and urged 'proactive training' in this area. The ability to attend to language sounds, if one is to match them to corresponding graphemes, seems pivotal to literacy, yet may be an area that is overlooked once formal teaching begins. Early attention to these skills would appear sagacious.

2.3.6 Phonics

Phonics is the way that children are taught to match language sounds to alphabetic symbols. It requires an ability to detect sounds within words (PA) and knowledge of the alphabetic principle. Children are taught to match graphemes (letters and letter

combinations) to their corresponding language sounds (phonemes) and to segment and blend these sounds in words to read and write them respectively.

Hammill (2004) proposed that children's knowledge of letter names and sounds is the best predictor of their later reading and spelling abilities. Piasta and Wagner (2010) studied fifty-eight preschool-aged children (age 3 and 4 years), and found that letter name training, when **combined** with sound instruction, may causally impact students' letter sound acquisition. Children were more successful at learning letter sounds when they also learned the letter names.

Letter name and letter sound knowledge predict subsequent literacy skills independently of other important predictors including phonological awareness and oral language. McGuinness (1998) however argued strongly against the teaching of letter names and determined that teaching children the names and sounds would be confusing for children. This belief pervades the policy in some schools, resulting in children being unable to recite the alphabet. This impacts upon later use of a dictionary and is contrary to the theory that memory retention is promoted by association. Learning only letter sounds gives little context to the letters and relies upon children possessing a sound background of knowledge of print. Naming items is a natural process for children and to deprive them of this part of the learning process depletes the associations they are able to make. Additionally, when a child reads a word, they are effectively naming that word in the same way that they may name any other visual image. Naming letters is part of the process of learning the alphabetic principle.

2.3.7 Motor Skills

A strong positive relationship exists between motor proficiency and pre-reading skills (Milne et al., 2018). Movement helps brain development and positively impacts learning. Eliot (2000:155) reported a study of the effect of movement on babies' development. Babies aged 3–13 months old were subjected to sixteen sessions of being spun on a chair whilst sat on their parents' knee. The babies loved the treatment and showed advanced development of their reflexes and motor skills compared to control groups. This demonstrated that vestibular stimulation is good for the mind and body. The vestibular system is the sensory system that detects movement and helps to control balance. Music is motoric and even small babies will respond with movement upon hearing music.

Learning by doing may well help to secure experiences in the memory, as the physical act adds another dimension to the learning experience and may stimulate an increased number of synapses to make connections. Movement may also foster feelings of wellbeing and induce positive emotions. In response to movement, the brain produces endorphins that make people feel good and this renders the brain more receptive to learning. Using both sides of the body uses corresponding sides of the brain, too, simultaneously exercising both. Feeling good helps people to function most effectively (Sarno, 1998 and Hamilton, 2005).

Kohler et al., (2002) and Keysers et al., (2003) in Stanton and Spence (2020), showed that neurons in the same part of the brain are discharged in monkeys, both

when a movement is performed and when a monkey hears a sound of the movement being performed, thus determining a connection between movement and sound perception. Diamond and Lee (2011) found that the ability to think, plan and act in children aged four to twelve years of age could be developed through physical as well as cognitive activities. Movement adds a multi-sensory dimension to learning, which might otherwise be through only listening or watching, and can help to consolidate memories. By engaging multiple senses children are more likely to learn effectively. One study which integrated auditory, rhythmic (moving) and literacy skills was one by Frey et al. (2022), who stated that rhythmic activities co-ordinate action, cognition and language processing and specifically oral language skills. Their results found correlation between rhythmic skills and literacy skills. Rhythmic information, such as that found in nursery rhymes and the singsong language used with infants (infant-directed speech - motherese) has been found to support the earliest language learning (Di Liberto et al., 2023).

2.3.8 Motivation

Without motivation to read and write a child will not make progress. A child needs to believe that the process will be a valuable one and that he will be successful in order to be motivated to undertake it. It also helps if the process is an enjoyable one. Bandura (1977) believed that when a child believes themselves to be successful then they develop a sense of self efficacy, a confidence and belief that they can control their achievement. This sense of worth increases a child's motivation. It can be built by social experiences and the beliefs of those around

them. When literacy is a valued experience and one that occurs in a child's environment then they will have greater motivation to engage with literacy practices than if it is not valued or experienced. Gambrell et al., (1996) found that students' self-concepts of the value they place on reading are critical to their success. Mazzoni et al, (1999) found that students' first year of formal literacy training (age six years in USA and age seven years in Finland) was more motivational for the students than the second year and that girls were more motivated than boys. A further study in 2019 (Orellana et al.) found that motivation increased towards the end of the year and that reading out loud in front of a class was not a motivational activity for children, but that reading to a teacher was perhaps less threatening. There is a strong correlation between motivation, self-concept and achievement, indicating that it is important for children to believe that reading is important and that they will become successful readers.

There is, however, no prescribed sequence for early years literacy learning in the CfE, only an inference of absorption in a literacy-rich environment. Exposure to text, being read to and learning that text has language meaning is an obvious precursor to bibliographic knowledge and concepts of print. The CfE lists experiences and outcomes (Scottish Government, 2017b) to facilitate curriculum design by early years practitioners. Ultimately children must be able to match language sounds to written symbols. This requires awareness of the sound components of words and the ability to manipulate them. Experiences must be offered which enable children to develop these skills. Motivation to read and write and motor skills, support this learning. Musical activities are an appropriate vehicle through which these skills can

be delivered, drawing children's attention to musical and language sounds and in addition, they are motivational and induce movement.

2.3.9 Visual Skills

In order to read, children must have the visual capacity to discriminate shapes and need to learn to recognise the letters of the alphabet. Both eyes must work together in a process referred to as 'teaming' and they must be able to focus effectively. Children must also be able to track visually across a page, which necessitates the use of cognitive, visual and motor systems. This system must operate fluently for reading fluency to occur. Although this research is examining the coalition of music and literacy, which is predominantly focussing on awareness of sound and in particular language sounds, the role of visual skills should not be dismissed, as any defect in the visual process will impact substantially upon the ability to read and write text.

2.3.10 The Ability to Keep Time

Children who are not able to perceive the temporal structure of sound, as in the case of those with dyslexia (Goswami, 2011) do not process auditory input the same way as non-dyslexics. This can be evident in the speech of a dyslexic child when they are unable to correctly pronounce words and especially multi-syllabic ones. This problem with auditory processing also becomes evident when children are required to keep time. The ability to synchronise movement to auditory stimulus is

correlated with reading ability (Tierney and Kraus, 2013b), as children who cannot correctly discern auditory input are likely to be impaired in their ability to detect sounds in speech.

2.4 Music

This section seeks to define the concept of music and review the literature which examines how the knowledge, skills, and experiences which are foundational to successful literacy outcomes have been shown to be promoted through music. Music may be defined as a composition of sounds, but generally inferred is that these sounds are pleasurable, personal preferences excepted. Whilst almost any noise may be incorporated into musical composition, sound alone does not make music. Music has structure, pattern, rhythm and variation in pitch, much the same as language. It may be vocal or instrumental and consists of a continuation of sound.

In studies where music ability, musical aptitude or musical perception have been measured, the main elements measured have been those of ‘pitch’ (higher and lower sounds on a musical scale) and ‘rhythm’ the succession of strong and weak beats. An explanation for this is offered by Douglas and Willatts, (1994:4) with reference to Bentley, (1966), that sounds have a ‘meaningful relation’ to each other in terms of pitch and rhythm, thereby identifying these as major components of music. However, there are other elements of music which identify ingredients of sound. Kraus (2022) identifies them as pitch, timing and timbre. Timing relates to

the ability to maintain a beat and to keep up with someone else playing a beat. A drummer will lead in keeping the beat for a band and the band members must keep their music in time so that the playing is synchronised. Timbre is the quality of a sound and is what enables a person to distinguish the same music played upon a trumpet or a violin. Timbre and dynamics in music are similar to prosody - intonation and stress – respectively, in language.

Music is most often perceived as a pleasurable experience; it is a leisure activity, and we listen to music and participate in musical activities for pleasure. Few people respond negatively to all music, though there are some people for whom music is perceived as dissonant and disagreeable; these people are termed ‘amusics’ (Sacks, 2008). The metaphor ‘music to my ears’ exemplifies how society generally perceives music to be a pleasurable, sensory stimulant.

The recreational role of music enjoyed today may not always have been the case. It is possible that music and language share common origins. Brown (2001), a neurologist, coined the term ‘musilanguage’ to describe his hypothesis, building on Darwin’s belief that music and language have common ancestry. ‘Musilanguage’ is a stage of evolution wherefrom music and language have developed. Brown also describes music and language as two forms of auditory communication and suggests that they are homologous in that they possess comparative features.

There are two main schools of thought as to the first early communication systems or proto-language. Bickerton (2007) believed that proto-language was

compositional; composed of words which related to a mental concept such as ‘meat’, ‘fire’, ‘hunt’, with little or no grammar. Alternatively, Wray (1998) identified proto-language as holistic in that the first communication system was composed of messages rather than words. These messages were later segmented into words. Whilst these two theories did not refer to music at all, Mithen regarded this as an oversight and incorporated music into his own theory of early language.

Mithen believed in a single precursor to music and language, referring to Rousseau’s description of first language as ‘*a kind of song’* (Mithen, 2006:26) and contended that in fact music has a much more important role to play than is currently assigned to it with regard to our communication system. Mithen referred to his form of single precursor to language as ‘Hmmmm’ based upon the first gestural and music-like vocalisations of apes. Hmmmm is an acronym for Holistic, multi-modal, manipulative, and musical. He determines that music is manipulative in that it affects our emotions and is motoric. Language may be both manipulative and referential as it tells us about the world and can drive us to action. Music is inherently part of our genetic make-up and a resource upon which we could readily draw to facilitate language development.

Like Mithen, Malloch and Trevarthen (2009) believed music to be a natural form of early communication, especially between mothers and babies. They described it as ‘communicative musicality’. Mithen (2006) discussed how infant directed language (IDL) is somewhat musical in nature, with elongated sounds, variations in pitch and sing-song tone. This is attractive to infants and seems to be an automatic way for

many to speak to babies and one which assists the babies in developing their own language. Safffran in Mithen (2006) suggests that young children may lose their innate musicality when they learn language. Mithen posits that conversely, musical savants may lose their language, as in the case of some autistic children. Children who continue to learn music through childhood seem able to maintain both.

Both music and play are natural pastimes for children and ones through which they can learn. Zachariou and Whitebread, (2015:119) in their exploration of musical play on self-regulatory behaviours during musical play sessions, refer to the term 'musical play' and suggest that it may include '*handclapping games, circle games, movement play and instrumental play*.' They also point to compelling evidence that guided play (such as in a structured music session led by a teacher) is *'a vital catalyst for intellectual, emotional, social, moral, motor and linguistic development'* (p121). Other evidence shows that young children engage in music as play (Moorhead and Pond, 1978, and Neelly, 2001). Children enjoy playing with sound, making and moving to sounds. Children readily join in with musical activities which offer an ideal medium for learning through play. Skilful performance of handclapping songs was found by Brodsky and Sulkin (2011), to impact efficiency of first grade and verbal memory and handwriting in second graders.

The Early Years Framework, Scottish Government, (2009a:18) states:

> *'Play is central to how children learn, both in terms of cognitive skills and softer skills around relating to other people. It is a fundamental part of children's quality of life and a right enshrined in the UN Convention on the Rights of the Child*.'

The early years framework also stresses the importance of positive and physical health development. Music is motoric, movement stimulates the brain.

2.4.1 Music and Learning

The first thought process identified in Bandura's 'mediational processes' of 'attention' is one which can be satisfied by music as it is 'attention grabbing'. Also, music is motivational (Madsen and Forsythe, 1973), Bandura's fourth thought process. Children are attracted to music (Fröebel, 1895a) as it is enjoyable, inclusive and non-challenging. The use of music as a conduit for learning is much promoted (Musacchia and Khalil, 2020; Sheppard, 2007).

The extent to which a society uses music as a learning vehicle may relate to its social and cultural habits. Musical groups for early years children and music lessons in schools in Scotland, tend to be separate activities from other parts of the curriculum. Music specialists may attend schools on a regular basis and music is not integrated throughout the curriculum. This is contrary to the CfE's 'literacy across the curriculum' directive where responsibility for literacy competence should be the concern of every teacher and practitioner.

The learning outcomes for music, (under the area of 'expressive arts' along with dance and drama) in the Scottish early years' curriculum are viewed as a means of enjoyment:

I enjoy singing and playing along to music of different styles and cultures.
EXA 0-16a

I have the freedom to use my voice, musical instruments and music technology to discover and enjoy playing with sound and rhythm.
EXA 0-17a

and expression:

Inspired by a range of stimuli, and working on my own and/or with others, I can express and communicate my ideas, thoughts and feelings through musical activities.
EXA 0-18a / EXA 1-18a / EXA 2-18a

I can respond to music by describing my thoughts and feelings about my own and others' work.
EXA 0-19a
(Scottish Government, 2017d).

There is little reference to any interdisciplinary working, or acknowledgement that such activities may be used across the curriculum or to support other aspects of learning. The music in the early stage is considered to be a foundation for the following more formal teaching of music. Whilst there is reference in the literacy

curriculum – although not explicit in the experiences and outcomes, as it in the advisory document for benchmarks – to introduce music by way of songs -

- participates actively in **songs**, rhymes and stories and
- engages with and enjoys watching, reading or listening to different texts, including stories, **songs** and rhymes and can share likes and dislike.
  (Education Scotland, 2017)

the only area of overlap is the experience of 'playing with sound' which can be found in both the literacy and music curricula -

> *exploring and playing with the patterns and sounds of language*.
> LIT 0-01a
> (Scottish Government, 2017b).

> *playing with sound and rhythm*
> EXA 0-17a
> (Scottish Government, 2017d)

There is nothing to suggest that music could be used as a vehicle to help students to learn in other areas of the curriculum, which suggests that it not particularly likely that teachers will attempt to link different areas of the curriculum.

Cultural and social groupings determine the types of activities that people are likely to participate in. For example, in Finland the researcher, whilst investigating literacy practices there, visited musical preschools which are very popular and have been found to impact favourably upon children's auditory skills (Putkinen et al., 2015) and also, ability to sustain activity, more positive emotions increased social adaptation and social involvement with adults, as well as enhancing the learning environment (Ruokonen et al., 2021). These groups encourage children to play with sound and incorporate activities such as reading and responding to symbols and creative drawing at the end of sessions to express children's experiences of the session. The activities witnessed exemplified Brandt and Gebrian's (2012:3) definition of music as '*creative play with sound'*. Musical activities can provide an excellent learning environment which is conducive to the education of young children.

2.4.2 Music and Cognition and the Importance of Early Training

There is much evidence to show that music training enhances brain function (Bailey, et al., 2014; Bilhartz, et al., 2000, Dess, 2000; Gerry et al., 2012; Meyer et al., 2014). In 1995 research from Schlaug et al. showed that musicians have larger corpora callosa than non-musicians. In effect, musicians have larger brains. Engaging in musical activities stimulates the use and subsequent retention of developing synapses (junctions between two nerve cells). At around 80 months of age synapses which are unused begin to die. This process is known as synaptic pruning. When we learn synapses are used. The more synapses we stimulate the more we have for later use. It was once believed that synapses could not be

regenerated. However, research from Butz and van Ooyen, (2013) showed that, a small percentage (10%), of synapses in the visual cortex, are continually replaced with new ones. Listening and engaging in musical activities stimulate many areas of the brain. Alluri et al. (2013) asserted that music activates auditory regions, which process sound, motor regions which process rhythms and limbic regions, which process emotions. Just listening to violin music stimulates and 'balances' both sides of the brain (Hasminda-Hassan et al., 2011) and even when imagining a piece of music or imagining playing it, these areas are still stimulated (Marion et al., 2021).

Relatively short periods of music training have strong consequences on the functional organisation of a child's brain (Moreno, et al., 2009; Meyer et al., 2014). Evidence from Kraus and Chandrasekaran in 2010 also determined that music training can cause functional and structural changes in the brain. Such training in childhood is associated with long-lasting intellectual benefits (Schellenberg, 2005). Schellenberg determined that music develops abstract thought which helps to make connections across contexts. His research in 2004 found that music lessons raised IQ in six-year-olds (Schellenberg, 2004). In 2008 with Peretz (Schellenberg and Peretz, 2008) he investigated the effect of music training on IQ. His research found evidence of transfer but no conclusive evidence of causality. However, in 2011, Moreno et al. did show evidence of causality with a computer based musical training programme.

Following on from research which showed that adult musicians who began training before the age of seven years performed better on visio-motor tasks (such as

writing), Bailey and Penhume (2010) investigated if the same would be true for auditory rhythms. The earlier trained adults (before the age of seven years) were better at producing the temporal structures of rhythms than later trained adults. This research supports the idea of a sensitive period during early childhood for the development of sensorimotor synchronisation abilities via musical training.

Research shows that 'music trains the brain' and makes it more receptive to learning and memory retention. Music also has a positive effect on both mind and body. A healthy mind affects a healthy body and vice versa (Hamilton, 2005: Sarno,1998). Good health and wellbeing impact upon learning and this is promoted in the CfE:

> *'Learning through health and wellbeing promotes confidence, independent thinking and positive attitudes and dispositions. Because of this, it is the responsibility of every teacher to contribute to learning and development in this area.'* (Scottish Government, 2017c:1).

2.4.2.1 Music and Comprehension

There is evidence to show that music can be used to aid the comprehension of text. Frasher, (2014) developed musical activities to support each of the six reading strategies suggested by Tanny McGregor to aid comprehension when reading – schema (background knowledge), inferring (reading between the lines), questioning, determining importance, visualizing and synthesizing. Frasher, (2014:9) explains 'synthesizing thinking' from McGregor, (2007) as being like a spiral - '*many childhood songs and rhymes are structured on a spiral where each new verse builds upon the previous one'*.

Register et al. (2007) found that the transfer of word-knowledge skills to reading comprehension may be facilitated by the addition of music-based strategies. Teachers in their study explained new words to children, that were used in songs and in the stories they read. This in turn helped comprehension. Register et al. reported that this transfer was not automatic but was facilitated by the teacher's explanation. If music helps to embed memory as evidenced by Baird and Samson (2013), then music could support the learning of songs and rhymes and subsequently embed the memory of what was comprehended.

Many non-native speakers have attested to learning English by listening to English songs and certainly in many malls abroad, English music is played, which may subliminally if not consciously, impact language learning. Zaraysky (2009), a multilinguist, explains in her book, 'Language is Music' that listening to music is like listening to language and that listening to music of a foreign language helps to embed the sounds of that language in the brain. She also says that music engages both hemispheres of the brain, which she attributes as leading to greater comprehension of language being received.

Moyeda et al. (2006) implemented three comparative interventions, to promote language ability. One was with no music, one with rhymes, songs and games (the official program) and a third, a music program including associations with visual stimuli and motor actions which was designed specifically to promote vocabulary. Thirty KG Mexican children were tested on the Peabody Vocabulary Image Test pre and post the interventions. This tested receptive vocabulary, the vocabulary that the

children could comprehend. The sessions were held twice per week for twenty sessions. The musical programme which was designed to promote vocabulary was shown to strengthen ability in phonemic awareness and the children's scores on the Peabody test were significantly higher post-test than pre-test. The activities integrated auditory, visual and motor skills, to which the researchers attributed their success, along with the fact that the intervention was designed specifically to help children to discriminate sounds and form auditory-visual associations. The children undertaking the regular session of rhymes, songs and games did not demonstrate any increase in vocabulary scores. Phonemic awareness was found to correlate with melody and timbre correlated with receptive vocabulary. An earlier study by Anvari et al. (2002) also showed that activities which promoted melody and timbre discrimination helped to stimulate receptive vocabulary development.

2.4.2.2 Music and Attention

The ability to focus and maintain attention assists the ability to learn. The engaging nature of musical activities helps children to focus and pay attention; music can create mood, stimulate imagination and is immediately attractive to young children, encouraging their participation. Wolf et al. (2000) showed that engagement facilitates learning. Standley and Hughes (1997). found that following musical training, children's ability to pay attention improved. In 2013 Putkinen, et al.'s study investigated the effects of informal musical activities upon two-to-three-year-old children and found less distractibility in children who had more informal musical activities in their home environment. Further evidence of music's ability to focus

attention in children comes from Kasuya et al., (2020) who compared a thirty minute music intervention with a thirty minute video game. The results indicated significant improvement in attention switching, when IQ traits were controlled, for the music intervention – the playing of various percussion instruments according to instructions from the experimenter and no changes for the video game intervention – a bowling game on a Nintendo Wii. Strait and Kraus (2011) found that musicians were better at focussing attention on sound than non-musicians and suggested that this may aid the prevention and remediation of children with language, listening and learning impairments.

2.4.2.3 Music, Sequencing and Prediction

The use of music is particularly effective for young children when learning sequences. Any sequence set to music is more easily recalled than one which is not. Hence singing the alphabet, days of the week and months of the year is an ideal way of helping children to remember information in a specified order (Sheppard, 2007). Chang (2000), concluded in his review of literature of music learning and language reading that one of the six transfers of learning from music to language is the skill of prediction. Hansen et al., (2021) found that when listening to music, the brain predicts what is coming next and that, with music, the same as in life, a person predicts what is to come based upon their previous experience of the same event. This indicates that music can help the brain to practise prediction skills and that it could support language prediction, when singing for example.

Children's musical activities may build intensity to end with a 'pop' or 'splash' such as the rhyme 'Five Fat Peas' or 'If You See a Puddle'. Children learn to anticipate these endings and enjoy adding the noisy finale. This type of rhyme helps children to build an awareness of sequence, it may also help children to remember sequences and recognise when the ending is approaching. The structure of music sessions themselves may use familiar opening and closing songs which help children to recognise and anticipate sequence.

2.4.2.4 Music and RAN

There is also a link between RAN and musical ability. RAN, the ability to name items fluently, is an indicator for good literacy skills and particularly reading fluency. Bonacina et al., (2021) found that children who were able to synchonise to a beat scored higher on RAN tests that children who could not.

Music has been shown to enhance fluency in reading (Rasinski and Homan, (2009). In 1996, in her article about music and literacy, Kolb discussed methods of developing fluency of reading such as choral and echo reading and singing activities. She also determined that the chanting of jingles and rhymes assists in the development of phrasing and intonation.

2.4.2.5 Music and Memory

Information set to music is easier to remember than without music. Learning through music helps to embed long term memory (Ludke et al. (2013), referring to evidence from Thaut et al. (2008). They believed this to be due to the ability of the song's rhythm to increase the efficiency of neural firing patterns. Brown et al., (2014) suggested that music acts as a cue to unlock information due to rhythm, (the same as Ludke et al.,) but also due to rhyme or alliteration. These effectively provide a link to facilitate memory recall. Repeated retrieval makes information stick. Williamson et al. (2012) suggested that music may invoke memories involuntarily (a phenomena they term 'earworms'). This occurs when a piece of music pops into a person's head, seemingly unintentionally.

According to Baddeley's working memory model, Garcia (2014) examined how music is processed and found that it is partially processed in the phonological loop along with language. He found that the mechanisms used to process tones and phonemes in working memory might be slightly different but that they are processed in a similar way. This would explain how music could help to support memory of language as they are processed together at some point.

Webb and Webb, (1990:308) describe music as '*the interstate highway to the memory system'*. In the same way that we can imagine pictures in our minds we can also imagine sounds. When we hear music that is not actually present, we may refer to this as 'inner hearing' or 'internalising'. Gordon, (1979), a music education

researcher, coined the term ‘audiation’ as a more extensive term to include ‘thinking’ and ‘comprehending’ the music in addition to ‘hearing’. This is an important ability as it enables a person to imagine a piece of music and recall it. It is one which can be promoted through musical activities. Young children are able to do this in the same way that they reproduce word sounds. Confirming that ‘*music is an exceptionally efficient vehicle for memory processes,*’ Sheppard (2007:78), discussed how much easier it is to remember the lyrics of songs than to remember prose and also indicated that the use of repetition in songs and rhymes supports memory retention.

Although researching consumerism, Nunes et al., (2014) found that processing fluency of daily music, was a result of lexical repetition and not a consequence of repeated exposure and that this ease of processing led to listening preference. Thus, songs with lexical repetition; this may be of words, phrases, lines or stanzas, are more quickly adopted in the marketplace. It is not surprising that this is a feature of nursery rhymes and songs for young children, for example, the use of choruses which are easy to join in with, and one which may account for the ease with which these are both remembered and enjoyed.

Rainey and Larsen, (2002) also found that learning through song led to better memory and quicker relearning of a list of proper names as opposed to speech. Musical mnemonics are another way of helping memory recall (Scottish Government, Deacon, 2011). Repetition with music can be pleasurable; children enjoy repeating songs over and over, whereas if something were to be drilled

without music then it would become dull and monotonous. Children more easily learn to recite the alphabet through song, for example than by rote.

The brains of musicians have a larger planum temporal region on the left hemisphere, and verbal memory is mediated mainly by the left temporal lobe, (Chan, et al., 1998). Upon testing, Chan et al. found that adults with music training learned significantly more words than those without on a word learning test. Their results suggested that music training may have a long-term effect on the improvement of verbal memory. Tierney, et al. (2008) in Besson et al. (2011:7) reported that musicians can hold more information than non-musicians and/or for longer in auditory memory than non-musicians. Kraus and Chandrasekaren, (2010) explained that music training involves high working memory; this offers an explanation for Pallensen, et al.'s (2010) findings that musicians have enhanced working memory. Of interest also, is whether one may be born with musical aptitude, the suggestion that a person may have a predisposition to musical ability. Kraus and Chandrasekaran, (2010) and Strait and Parbery-Clarke, et al., (2012) determined that although there may some genetic disposition to musical talent, musical skills can be trained.

2.4.3 Music and Language

A major area of overlap between music and literacy is that of music and language. Brown (2001), a neurologist and Mithen, (2006) an archaeologist, built on Darwin's belief that music and language have common ancestry. Brown coined the term

‘musilanguage’ to describe his hypothesis of a stage of evolution wherefrom music and language have developed.

Mithen also believed that the first language of man was a musical one. This idea forms the basis of the belief that both music and language are innate. They share a common origin. They are natural abilities and therefore ideal learning partners.

The point at which music and language may unite may be evident in nursery rhymes (Sheppard, 2007). The rising and falling patterns in nursery rhymes imitate the patterns in language. Sheppard (2007:83) suggests that ‘*at the early stage of language development, speech essentially is music*’.

Brandt et al. (2012) reviewed studies to present a case that musical hearing and ability is essential to language acquisition. They discussed how music and language converge in areas such as chanting, IDL and some poetry and that some peoples communicate musically, such as the use of ‘talking drums’ between African villages. Brandt, et al. (2012) also suggested that music and language have shared learning mechanisms, and that musical development keeps pace with linguistic development with little effort. They conclude that babies view language as music as they are not able to distinguish the sounds of language, language appears as mere sounds. They suggest that through music it is possible to absorb language, as does the linguist Zaraysky, (2009). Franco et al, (2022) add further support for singing to infants.

Babies have been found to react to music even prior to birth (Goddard, 2002, Blumenfeld and Eisenfield, 2006; Winkler et al., 2009). Reported by Cromie (2001), Shelemay, Professor of Music at Harvard stated, "*All humans come into the world with an innate capacity for music".*

Trevarthen, (2012) at the 'Generations; conference in Poland, stated in his presentation:

> *CHILDREN ARE BORN MUSICAL*
>
> *"They have the emotional sensibilities of a musician, without training in composition, or performance.*
>
> *They move with rhythm and explore the tones and melodies of their voice, imitating the intonations and narratives of other persons' expressions long before they can talk. They love to perform for the attention and appreciation of others.*
>
> *This is what we call 'communicative musicality'. It is the foundation for the learning of many stories of human interest besides music."*

The belief that music and language are innate, supports the constructivist view that much of learning originates from inside the child. However, we know from Curtiss, (1977) that if a child is devoid of hearing language from birth, then the child will not

develop verbal language. Although language is a natural skill, it is built according to a child's environment. This is concurrent with Merleau-Ponty's view that knowledge is assimilated from outside the individual and by internalisation through the senses (Merleau-Ponty, 1996).

Patel (2010) also believed that music and language share common roots in evolution and investigated the processing of classical music and language in the brain. He drew parallels between the processing of pitch, timbre, rhythm and melody. Patel also suggested that the language of a country is reflected in its music. This prompted him to pose questions such as whether or not we can learn songs with similar meters to our own language easier than songs with completely different meters.

In 2011, Patel presented the OPERA hypothesis that music training benefits speech processing through **overlap** in the brain networks, **precision** in that music places higher demands on precise performance than speech, **emotion** because musical activity elicits strong positive feelings, musical **repetition** that reinforces engagement of the shared networks and **attention** because music demands focussed attention.

Music can provide an ideal medium for the delivery of language skills. Stansell, (2005) approaches the correlations between music and language from a language perspective and describing them as both, 'supportive sisters' and 'natural partners.' In his article 'The use of music for learning languages', he explores the role of music

in the learning of language and the commonalities between each. Comparisons have been found and correlations made between music and language also by Sloboda, (1989); Brown, (2001); Galliford, (2003); Jordan-DeCarbo, (2006); Patel, (2010); Moyeda et al., (2006); Taylor and Clark, (2006); Sacks, (2008); Piro and Oritz, (2009) and Kraus and Chandrasekaran, (2010). Musicians outperform non-musicians on language tasks – Chan, et al., (1998) and Kilgour et al., (2000). The work of Ludke, et al., (2013) proposed that singing can facilitate foreign language learning. There is some evidence in support of a causal influence of music on language skills from Corrigall and Trainor (2011).

The correlation between music and literacy is an area which has attracted the increasing interest of neuroscientists since the advent of the MRI (Magnetic Resonance Imaging) scanner in 1977, as this has enabled scientists to measure brain activity in response to a variety of stimuli. One such study is that of Meyer and Spray, (2014) who showed that music and language share neural pathways in the brain. Zatorre and Belin, (2001) also found that some aspects of music appear to have left brain dominance and are the same areas as those associated with language skills.

As well as being accessible by young children, music has much in common with language – it has structure, pattern, sound, rhythm and variation in pitch. It would seem an ideal medium through which to develop sensitivity to language sounds.

2.4.3.1 Music and Listening

The ability to 'listen' and to be aware of, perceive and process sound is one which is vital to phonological awareness. Various studies have considered whether musical activities could be used to promote auditory skills. There is also evidence that musicians are more sensitive to speech sounds than non-musicians from Besson, et al. (2011).

Miller (2016) referred to three types of listening:

- Focussed listening – identification of a specific sound, for example, a letter sound, or quality of sound/timbre
- Causal listening – beyond the sound – what caused the sound?
- Semantic listening – listening for the meaning of the sound

Miller also suggested that one can also have awareness of kinaesthetic sensations caused by a sound and not the sound itself. She proposed that in addition to experiencing sound as a vibration it is possible to experience sound as airborne sound as it touches the body. Whilst vibration goes through another material before reaching a person, airborne sound is sensed directly from the source.

2.4.3.1.1 Music, Auditory Skills and Sound Processing

For the purposes of literacy learning a child needs to be able to focus on sound, that is, to employ focused listening. Some children may need to have their attention drawn to the variations in sound; where for some children this might be automatic, for others it may not. It may be dependent upon a child's early experiences of language and interaction with their parents and others around them. Putkinen et al., (2013) found that parental singing was highly effective in maintaining the attention of infants and that the undertaking of informal musical activities at age 2-3 years of age enhanced children's auditory development.

In order to learn any language, it is important to be able to process the sounds that we hear. Tallal and Gaab, (2006) investigated the use of musical training for children with language learning impairments (LLI) and found that the music training improved auditory processing and language development. They also found that auditory processing deficits were not necessarily a cause of phonological deficits and that a cognitive deficit specific to the representation and processing of speech sounds in words may account for poor PA skills, especially in children with dyslexia. Later, Strait et al. (2012) and Slater et al. (2015) found in their investigations that music training did impact favourably upon speech perception.

When the perception of one sound is affected by the presence of another sound, this is known as 'auditory masking'. Where two sounds run closely together a child may fail to perceive the first sound (backward masking). This is a problem found in

children with LLI and may result in a child for example not being able to detect the difference between ‘ta’ and ‘da’. It is possible that musical training may help children to focus more closely on sound differences in language.

Several researchers have found that poor auditory processing correlates with reading problems, according to Papadimitrious and Vlacos, (2014) and Strait and Kraus al., (2011) and others in Anvari et al. (2002). Corriveau et al., (2010) examined the relationship between auditory processing and early literacy skills in three-to-six-year-old children and identified auditory rise time sensitivity as important to the development of PA skills especially in the development of awareness of rhyme.

2.4.3.1.2 Speech-in-Noise

Musically trained children are more able to detect speech-in-noise than non-musically trained children (Strait, et al., 2012; Kraus et al., 2014; Slater et al., 2015). Conflicting evidence however was provided by Boebinger, et al., (2015) who found this not to be the case and that, musicians and non-musicians can perceive speech-in-noise equally well.

Whilst Strait et al.’s experiment on children aged seven to thirteen years considered children who had practised for at least four years, Kraus’ found lasting benefits of music for children after two years on language, but not after only one year. Strait et al. and Kraus also found benefits for those who started musical training early but

ceased at a later age; Kraus credited changes to the brain for this lasting benefit. Two years of training was also found to confer significant benefits for speech-in-noise by Slater et al. (2015), where more hours of training related to greater performance of perceiving speech-in-noise. They stated that the 'musician advantage' is not a reflection of pre-existing differences between those who pursue music and those who do not.

2.4.3.2 *Music and Speaking*

Research which has investigated the value of musical activities to speech, tends to come mainly from music therapy. The work of Lionel Logue portrayed in The King's Speech, Seidler, (2010) famously used slowed down music to help King George VI overcome his stammer by first singing his speeches. By gradually speaking instead of singing, he was then able to deliver his speech. Stahl and Kotz, (2014) reported that, the effectiveness of singing as a method of treating a stammer is due to the rhythm and familiarity of the song, rather than the melody. There is also the technique of playing music over headphones while speaking which enables the speaker to not hear their own voice and this therefore enables them to deliver a speech without stammering.

Chanting seems to offer a bridge between music and speech. Cummins, (2015) describes chant as an intermediate form of vocal activity along with group recitations, prayers and protest calls. In his blog on chanting (2013) he says that (sung) chant is speech with a minimal music ornamentation, it shares musical

elements but lacking in melody and harmony. In accordance with Douglas and Willatts' (1994) description of what makes music, it does have pitch and rhythm. In his paper 'Joint Speech: The Missing Link Between Speech and Music?' (Cummins, 2013), Cummins describes speech and music as being on a hypothetical continuum thus - music, song, chant, joint speech, talking, monologue and silent speech. If music is predominantly processed by the right hemisphere of the brain and speech by the left it would be interesting to know what part of the brain processes chanting. Music therapy is an area where music has been used more extensively than in mainstream classrooms to support language learning. Groß et al., (2010) conducted a therapy to promote speech development, comprising singing and making music with percussion instruments They tested receptive speech, productive speech and memory of speech (phonological memory for non-words, memory for sentences and memory for word sequences). Eighteen children aged three and a half to six years with speech delay underwent music therapy sessions or no therapy. The improved results of the music therapy group were found to be related to prosodic features. The improvements were due to the promotion of listening, perception, processing, memorising of sounds and music structures. Groß et al. proposed that reproducing phonologic structures could support language development. They suggested that rather than be the result of any one aspect, the therapy might integrate different aspects in a comprehensive way.

It has been suggested that musical activities could be used to identify those at risk for language learning problems, as a diagnostic tool: (quote from abstract)

> "*Our results provide implications for the use of an ecologically valid music-based screening tool for the early identification of reading disabilities in a classroom setting'.*
> (Zuk, et al., 2013).

White-Schwock, et al. (2015) also made this suggestion.

Patel, (2010) discusses that the language of a country is reflected in its music and that we are able to differentiate the music of different countries. Hannon (2009) found that this is due to rhythmic prosody. We effectively know how the sounds of our language sound and recognise their intonation, stresses, tones and rhythms. Hence repetition of language sounds through music helps to reinforce familiarity with a person's native tongue.

2.4.3.2.1 Prosody and Meter

Prosody encompasses the elements which contribute to expression in speech. It is in effect '*the music of oral language,'* Torgesen and Hudson, (2006:4). Prosody is a term referring to the linguistic functions of speech such as intonation, tone, stress and rhythm. It describes 'how' we speak. Music and spoken language both have prosodic features which directly overlap.

Thompson et al. (2003) examined the effect of music lessons upon the perception of prosody in speech and found that musical training enhanced adults' ability to extract prosodic information from spoken phrases. While rhythm is the pattern of sounds, meter is the stress placed on the rhythms in music or syllables in speech.

Children naturally pick up the placing of stresses as they learn to speak their native language. Foreign language learners may place stresses in the wrong place making the words sound very strange. Lyrics set to music help learners to practice patterns of stress as they are often emphasised by the music.

Huss et al. (2011) showed that perception of musical meter is predictive of PA skills and reading development. A simple metrical task was performed significantly more poorly by children with dyslexia than non-dyslexic children. They found that auditory difficulties and difficulties in metrical processing were associated. These then impacted negatively upon PA skills. Gordon et al. (2015) refer to further research suggesting that sensitivity to stress patterns in spoken language is correlated with emerging reading skills and predict later reading development. Bolden and Beach (2021) successfully used music notation to improve prosody and support reading fluency with third graders.

2.4.4 Music and Phonological Awareness

The ability to identify and differentiate the sounds in words is an important skill for literacy. It has been proposed that it is possible that this skill could be promoted by practise in attending to the sounds in music. The ability to attend to sounds in music has been found to be a skill which has shown transfer effect to literacy. (Anvari et al., 2002; Bolduc, 2009; Peynircioglu, et al., 2002; Degé and Schwarzer, 2011). Putkinen et al. (2015) found that musical activities have a causal relationship with the ability to differentiate sounds in music. Therefore, it would seem possible that,

the ability to differentiate sounds in music could help children to be able to identify the various sounds within words (Putkinen et al., 2015; Lathroum, (2011).

There are quasi-experimental studies which have conducted various forms of music training and compared the impact upon PA against other interventions. Degé and Schwarzer, (2011) conducted one such study. They implemented three programmes on five-to-six-year-olds and compared the effects of the impact of the programmes upon PA. Forty-one preschoolers were trained for ten minutes a day over a period of twenty weeks on one of three programmes - a music programme, a PA programme or a sports programme. The music programme was one devised by Nykrin, et al., (2007) and included joint singing, drumming, rhythmic exercises, meter execution, rudimentary notation skills, dancing and playful familiarisation with intervals. The PA programme was one devised by Küspert and Schneider, (2003) and the sports programme was devised by the authors and used as the control. The PA and music groups showed significant increases in PA from pre- to post-test on large phonological units (words) with the music group performing better than the PA group. All groups showed similar development on small phonological units (phonemes). It is not logical that the sports group showed similar development on phonemes, which suggests that there must have been some other confounding variable. Further research by Degé et al. (2015) found that music production as well as music perception was associated with several precursors to reading, including phonological awareness.

2.4.4.1 Music, Rhythm and Phonological Awareness

There is an increasing amount of research evidence in support of the importance of rhythm skills to PA. Moritz et al. (2013) found that rhythmic skill was related to phonological segmentation skill at the beginning of KG (age five years) and children with intensive music training during KG showed greater improvement in PA skills than children with less training. They argued that rhythm is a pre-cursor skill to oral language acquisition and the ability to perceive and manipulate time intervals in sound streams may link performance of rhythm and phonological tasks (Abstract). Moritz et al. pointed out that when a child is asked to clap out syllables in a word, they must elongate the time interval between the syllables as they sound them out. They also proposed that musical activities may also involve the manipulation of time intervals, hence providing practice in this important skill and suggested that these connections between rhythm and PA may begin in infancy (p6).

The ability to syllabify a word and to tap out the rhythm of a song both rely on phonological segmentation. Overy, (2003) found correlation between children who were good at spelling and also at tapping out rhythms. The ability to syllabify is important to spelling. Children who struggle to identify syllables in words may omit parts of a word when writing the word down.

Winkler, et al, 2009 showed that very young children appear to be able to maintain a beat. In their experiment they found that new-born babies developed expectation for the onset of rhythmic cycles. When the downbeat of a rhythm was omitted in an

experiment, the brain activity was consistent with violation of sensory expectation. This study contributed evidence to support the view that perception of beat is innate. However, not all children can keep a beat. Inability to synchonise with an external beat has been linked to poor pre-literacy skills and especially phonological awareness (Carr et al., 2014). Nave et al. (2023) found that music beat perception is predictive of PA but may not be fully developed until adolescence.

Verney, (2011) found that tempo discrimination was a key factor in the acquisition of phonological skills. This has also been found to be a contributory factor to PA in children with literacy difficulties, especially dyslexia (Goswami, 2013 and Overy, 2003). Bolduc and Montesinos-Gelet, (2005) built on Lamb and Gregory's findings (1993) indicating that children who obtain superior results in pitch processing also obtain higher results in PA and pre-reading tests. Verney (2011) suggested that the reason for this could be that, as a syllable change is often accompanied by a change in pitch then awareness of pitch may enhance phonological discrimination. He also found that the correlation of singing with phonological skills was less significant than drumming, suggesting that rhythm is more important to phonological discrimination than melody.

Slater, et al. (2013) also found that the ability to tap to a beat is linked to reading ability and can be strengthened by musical training. Bonacina et al. (2021), further confirmed that children with good beat perception performed better on preliteracy tests than children with poorer skills. Also, in 2013, Tierney and Kraus (2013b) investigated the relationship between auditory input and motor output in tapping a

beat. They suggested that listeners must track a rhythm in order to reproduce a beat at the correct time. They proposed that this tracking may share the same processing as language processing. They found that tapping performance related to reading, attention and backward masking. Patel, (2010) also noted the relationship between auditory and motor systems in a cockatoo which kept a beat to music. Beat keeping has also been confirmed in parrots, sea lions, elephants and humans. They have in common that they are vocal learners, they have the ability to imitate new sounds that they hear (Kraus, 2022). This indicates the existence of a link between sound perception and movement. The ability to tap to a beat is also related to socialisation and healing therapy (Kraus, 2022) and it is likely that these too are supportive mechanisms to children's learning.

Language is composed of rhythmic units of shorter and longer time scales – and children who are sensitive to these rhythmic units and can tap to a beat, learn to read and spell more easily (Kraus, 2022). Kraus determined that the rhythm in speech indicates when important information starts and stops and that the rhythmic aspect to spoken language is brought about by alterations in stress, duration and pitch of the syllables. The ongoing rhythmic flow sets up expectation of what is to come next, supporting Winkler et al.'s findings (2009). This helps language comprehension, which subsequently supports reading comprehension.

The relationship between the ability to perceive rhythmic units and phonological awareness may be due to parallel developmental sequences for perceptual processes (i.e., from global to local perception) and parallel neuroanatomical

functioning. Evidence suggests that phonological awareness correlates positively with reading development and that musical activities can help to develop phonological awareness; hence, musical activities should be able to provide a vehicle for developing a foundation for later reading skills.

2.4.4.1.1. Music, Rhythm and Difficulties with Language and Literacy

Much of the research relating to PA and rhythm comes from investigations into how interventions may help struggling readers and especially those with dyslexia as they can present problems with rhythmic entrainment. ‘Rhythmic entrainment’ is a term used in music therapy to explain two persons working together to the same rhythm – this may be actioned for example on a drum, where the teacher plays a rhythm and the pupil joins in so that they play together. It is analogous to Vygotsky’s ‘scaffolding’. The aim is that the pupil will then be able to keep the rhythm themselves. This can be implemented in groups as well as individually. This type of therapy can be used to help maintain any rhythm, for example, walking, breathing, speaking, dancing and drumming. Bharathi et al. (2019) suggested that rhythmic entrainment engages a large network of brain structures – auditory, visual, proprioceptive and vestibular perception and that it requires motor synchronisation, attention, performance and co-ordination. They determined that, “*Rhythmicity plays a vital role in development and timing is critical in motor control and cognitive functions.”* which may explain why training in rhythmic entrainment supports development of phonological awareness as it links motor skills and sound processing.

The ‘Double deficit hypothesis of dyslexia’ proposed by Wolf and Bowers, (1999) suggests that spelling deficits are associated with a phonological deficit whereas dysfluent reading is associated with naming speed deficit. The naming speed deficit is not due to auditory information but to lexical access. In contrast, musical training mainly affects sound processing and therefore spelling capability. The work of Overy, (2003), Overy et al. (2004) and Goswami et al. (2013) with dyslexic children has found that musical timing presents difficulties which impact upon PA. Huss et al., (2011) substantiated this further, determining that the accurate perception of rhythm may be critical for phonological development and subsequent literacy development.

There is evidence that children who have language-based learning impairments struggle to perceive rhythm in speech (Abrams et al., 2009; Goswami et al., in Verney, 2011:224) and perform poorly in tasks involving musical metrical structures. Verney therefore suggested that musical training may foster rhythm perception and production, thereby assisting in the development of language skills. He compared two interventions, one with music and one with rhythmic speech and no music. Both interventions improved rhyme and syllable awareness, with the greatest improvements being in the syllable tests. Verney concluded from this that musical interventions were successful due to their rhythmic element and not music per se.

In 1985, Atterbury, found that poor readers were impaired on producing rhythms but not on discriminating rhythms. Douglas and Willatts, (1994) also found that only rhythm discrimination correlated with reading ability. Kraus (2022) suggested that

whilst both entrainment and discrimination of rhythm relate to language skills, the mechanisms which facilitate these skills may differ, which accounts for the ability in some, to discriminate rhythms but not produce them.

As much of the research on the benefits of rhythmic training to literacy has been undertaken on children with learning difficulties, Bhide et al., (2013) suggested that further studies were needed to explore whether all children would benefit from music training, to see if music intervention should precede letter-based training and whether combined approaches would be most beneficial. In the same year, 2013, Moritz et al. examined links between music rhythm skills in KG and PA in second grade and questioned whether or not KG children with music training demonstrate more PA skills than those who receive less music training. The results indicated that rhythm skill was related to phonological segmentation. Rhythm ability was strongly related to phonological awareness and basic word identification skills in second grade. They determined that rhythm sensitivity is a pre-cursor skill to oral language acquisition and that the ability to perceive and manipulate time intervals in sound streams may link performance of rhythm and phonological tasks. Furthermore, Lê et al. (2020) found that significant correlation between rhythm and literacy persisted to third grade.

2.4.4.2. Music and Rhyme

Many children's songs contain lyrics which have rhyming endings. The value of rhymes to literacy is not in question. Maclean et al., in 1987 found that nursery

rhymes were strongly related to phonological skills. Using rhymes to teach children about sound patterns in language is an accepted part of an early years curriculum. Adding music to rhymes helps to embed learning further, Hahn et al. (2021) suggests that rhymes to music are slower than spoken rhymes and may therefore be easier to recognise than in spoken language. Nursery rhymes are often fun and have accompanying actions which children enjoy; movement and gesture help to embed learning, (Novack and Goldin-Meadow, 2015), further enhancing their function as a learning tool. Hahn et al. (2021) found that infants as young as ten and a half months were able to detect rhyming repetitions in sung nonsense rhymes, and that this subsequently correlated positively with their vocabulary at eighteen months of age.

Bostelman, (2008) studied the effects of rhyme and music on the acquisition of early phonological and phonemic awareness skills. Bostelman instructed sixteen students in the Alphabet Dance portion of the Phonics Dance programme, Dowd, (1999). Assessment was conducted through the DIBELS (Dynamic Indicators of Basic Early Literacy), for four months. The results showed an overall improvement in letter naming and initial sound fluency. She concluded '*that a program utilizing rhyme and music would be beneficial to preschool students in acquiring early phonological and phonemic awareness skills'* (p44). More recent research from Steinbrink et al., (2019), found a relationship between awareness of rhyme and pitch and contour (change in a melody due to a change in pitch) perception in five-year old children. Activities which draw children's attention to differences in musical sounds are likely to help with the discrimination of language sounds.

If musical activities can help to foster rhythmic abilities and subsequently the ability to identify syllables in words and also an awareness of rimes in the syllables, then this should also enable the identification of the onsets in the syllables.

2.4.4.3 Music and Phonemic Awareness

Lamb and Gregory, (1993) found a relationship between the discrimination of pitch and phonemic awareness in four- and five-year-old children. Loui et al., (2011) also confirmed a strong correlation. Anvari et al., (2002) found that melody and chord discrimination correlated with phonemic awareness and reading, thereby confirming evidence from McMahon's (1979) study but further identifying which specific area of PA correlated with the ability to discriminate chords. More recently, Steinbrink et al., (2019) found a relationship between phonological awareness and pitch and contour perception but the strongest relationship was between the ability to process rhythms (repeat a played rhythm) and phonemic awareness.

In 2005 Joyce Gromko concluded from her study that music instruction which emphasised the development of aural perception led to significant gains in the development of phonemic awareness. She determined that this was the result of the effectiveness of the near-transfer-hypothesis (transfer of knowledge between similar concepts).

As phonemic awareness is one of the best predictors of how well children learn to read (Ehri, et al., 2001; Hulme et al., 2002; Nation and Hulme, 1997) then if music

instruction promotes phonemic awareness, then music instruction should ultimately help reading skills. However, Forgeard et al., (2008) and Degé and Schwarzer (2011) found that music training did not correlate with phonemic awareness, while Rubinson (2010) found that it did. A reason for this discrepancy may be that detecting differences between musical sounds is not exactly the same as detecting differences between language sounds. Where a child is trained to detect differences in musical sounds this does not necessarily mean that the child will be able to detect differences between other sounds, although it is likely that the child will then have a greater awareness of sound differences and ability to tune in to sounds than a child without such training.

Rubinson, (2010) found strong correlation between tonal, rhythmic, and overall music aptitude and early literacy skills including alphabet knowledge and phonemic awareness. She tested sixty-two KG pupils. Music aptitude was assessed using the tonal and rhythm subtests of the PMMA tests Gordon, (1979). Reading achievement was measured via four subtests of DIBELS. She found correlation between music aptitude and early literacy skills including alphabet knowledge and phonemic awareness.

2.4.5. Music and Sound to Symbol Correspondence

If children learn to respond to visual symbols, then they learn that symbols can confer meaning to the reader. Children see many symbols in environmental print, such as the iconic ‘M’ for McDonald’s burger chain, ‘STOP’ signs and ‘LEGO’.

Musical activities may include props that children respond to such as pictures, graphic notation or words. If these are included in a program, then they can help children to gain knowledge about print. For example, singing the alphabet song from an alphabet book or, if graphic notation is used (pictures of notes or other symbols to represent what instrument to play or length of time a sound should be played) children may learn about the direction of reading text and the concept of sound to symbol correspondence.

If children learn to read musical score when they learn to play an instrument, then they are learning about the musical symbols and how they must be interpreted. This is unusual for very young children, but an early form is graphical notation which is often used in musical sessions for preschool children and one observed being used in Finland, by the researcher.

Hahn, (1985) explored the correlation between written language and music notation. She found that they were closely related processes and that reading in either area was facilitated by presentation of the material in context rather than separate unrelated components. Both processes involve a search for and construction of meaning. Hahn found that ‘a whole music’ approach (song to note) was more effective than a part-to-whole approach. This idea fits well with the development of auditory processing where children are receptive to rhythms, melodic patterns and then individual sounds. Further support for the use of the relationship between the two written systems of recording sound comes from Chang, (2000) who found that learning between two symbol systems was one of

the benefits of music experience on language reading and that this skill transferred between domains.

Standley and Hughes, (1997) used music to enhance the teaching of writing and prewriting skills in twenty-four children aged three to five years of age. They designed an integrated music and literacy programme which used music to teach alphabet letters, invented spelling, visual awareness and phonemic awareness. Instruction included: reading and writing stories, book handling, acting out songs with props and spoken/sung language activities. The children in the experimental group showed enhanced print and prewriting skills at the end of the fifteen, thirty-minute sessions. Register, (2001) replicated the study with a larger sample of fifty children. Again, children who received music-enhanced instruction made greater progress in writing and print awareness. Both these studies drew together music and literacy learning to explicitly teach the skills they wanted the children to acquire, they also made explicit the relationship between the letter shapes and their sounds. This type of training is one which Ball and Blachmann, (1991:64) attest to be 'pedagogically sound' - *"the most pedagogically sound method of phonemic awareness training is one that makes explicit the complete letter to sound mapping in segmented words"*.

2.4.6 Music, Learning and Movement

It is well accepted (evidenced by Ayers, 1972 and Hannaford, 1995) that kinaesthetic learning (by movement and doing) assists in the acquisition and

embedding of learning skills; hence singing, dancing and performing action rhymes will help to consolidate the learning of rhymes and songs. Where children get used to tapping out syllables to music, for example, this should become part of their muscle memory.

Movement to music by the tapping of rhythms has been found to activate the cerebellum, traditionally associated with balance, timing and motor control (Parsons and Thaut, 2001; Sakai et al., 1999). Jäncke et al. (1977) found that finger tapping rates were faster in adult musicians than non-musicians and that the tapping rate increased with duration of music training.

These studies show evidence of links between auditory, motor and brain functions. In order to function as a species, we rely upon all of our faculties to come together to complete a task. This is the same for literacy; effective learning requires the culmination and co-ordination of many systems. Music can impact many of our systems hence maybe, its ability to support functions across domains. Crossing the midline in action songs and rhymes helps both hemispheres of the brain to work together, Brodsky and Sulkin (2011) showed that hand-clapping songs improve motor and cognitive skills and may promote neater handwriting, the arm crosses the midline when writing and one side must be dominant. Delay in development of a dominant side may delay the development of fine motor skills and poor gross motor skills can negatively impact attention and working memory. The mind and body are related in a two-way process. When children are able to learn kinaesthetically, this helps to embed memory as it increases blood flow to the brain.

Chandler and Tricot (2015) reported that physical activity can have far-reaching benefits to cognitive development and learning as well as to the body itself, especially for preschool children when the brain is most plastic. As music is motoric it can automatically induce movement which will subsequently support learning.

The ability to co-ordinate perception of a rhythmic sequence in time with a physical action, such as beating a wooden block in time to a metronome (a sensorimotor synchronisation task) '*is a potentially effective instrument for predicting literacy outcomes and screening for potential difficulties'* **(**Kertész and Honbolygó, 2023: abstract).

2.4.6.1 Music, Movement and Language

A child's natural movement to music is utilised in Dalcroze music teaching. This method is also known as 'eurthymics' and uses a rhythmic foundation to encourage musical expression through storytelling, games and movement. It uses physical movements such as walking, running, hopping and skipping to teach rhythm, rhythmic patterns and phrasing. These are also important elements of language. Movement can be used to demonstrate and reinforce stresses, pauses, emphasis, duration and other aspects of language, for example, when children learn to listen for musical introductions or are able to anticipate that music is slowing down as it comes to an end. Using music in this way helps children to anticipate what is to follow as well as emphasising language structure. Research by Zachopoulou et al., (2003) showed that a music and movement programme, implemented twice a week

over ten weeks resulted in enhanced rhythmic ability in comparison with a control group which participated only in free-play activities at the same time. As rhythm is an important element of literacy learning it would seem that using music to reinforce rhythmic movement may be able to help children to embed the rhythmic patterns of language. It has also been found that listening to rhythms engages motor regions in the brain, without any actual movement taking place (Chen et al., 2008), thus confirming a relationship between rhythm and movement.

Additionally, gesturing supports language comprehension and language production and may indicate that a learner is in a prime state for learning (Novack and Goldin-Meadow, 2015). When music is added to further support such learning as in action songs, this must confer even greater benefits. Novack and Goldin-Meadow also avered that if a teacher gestures, then the children in the class are more likely to gesture, indicating that action songs and rhymes can only be beneficial to the promotion of both language and learning.

2.4.7 Music and Motivation

Music can be motivational and is often a social activity. Moving along with other beings helps us to entrain to their rhythms such as marching together. This is particularly relevant to literacy where rhythmic tapping to the rhythm in a song can help to identify the syllables in the words. Participation in musical activities activates the brain and causes the body to release endorphins which reduce stress, and listening to music causes the brain to release the compound dopamine. This has

been found to increase motivation and pleasure, reduce anxiety, promote brain function and assist movement and decision making.

Listening to a piece of music can induce a state of emotion associated with that music or due to the music itself. It can reduce anxiety or incite us to action. Imagining the music can similarly excite the brain (Marion et al., 2021). Participation in musical activities activates the reward system of the brain (Blood and Zatorre, 2001; Fiveash, 2023) and the amygdala (which is linked to negative emotions) is inhibited when listening to music. Hence, music and movement can promote wellbeing, part of a curriculum area identified by the CfE. Music is inclusive and can be undertaken by a variety of people and accessed at varying levels; it is generally non-challenging and enjoyable and offers a range of benefits to babies and young children (Kay, 2013).

The motivational nature of musical activities has long been accepted, for example, Madsen and Forsythe, (1973) and Standley and Hughes, (1997). The enjoyment of activities promotes the desire to participate and learn. Musical activities are active, involve language and are motivational for young children as they are fun and play-based, thus providing an ideal way through which to deliver early literacy activities. Frasher, (2014) confirms the belief that music is motivational, and highlights Register et al.'s (2007:36) statement that,

> 'music has the ability *to engage most children and it is the 'magic' of music that can motivate children to learn most any subject matter'*.

This is an aim of the authors of the materials on the website ‘songsforteaching.com’. Using music to support learning can add another dimension to learning as it helps to provide an unpressured learning experience.

An and Shi, (2013) in their examination of the listening process, also found that enjoyment fostered motivation and that lack of apprehension and anxiety assisted the ability to listen. Fisher, (2001:47) noted a ‘*general excitement and students humming as they worked’* in the classes in which music was used. This was not observed in the control group classes, where music was not used. Creating a non-threatening atmosphere where children may participate without fear of failure is important, especially for children who may have experienced failure in other areas.

As in many areas, success breeds success and Slater et al. (2014) reported that the success of the Harmony Project in the USA for age six-to nine-year-olds, which has been implementing musical programmes for low-income communities and has a waiting list of children wanting to join the groups, could be due to the children finding the music motivational and therefore eager to participate.

2.4.8 Music and the Learning Environment

During musical activities there is engagement with sound, engagement with others and engagement with the environment and the tools within it. Through music, children can learn a myriad of subjects, about the world and be able to express themselves in a modality involving communication and movement. A musical

environment is generally social, enjoyable and can put learners in a state conducive to learning. A positive effect from an extended music program in Finland, on the school environment was found by Eerola and Eerola (2013) to have enhanced the quality of school life, sense of achievement and opportunity. It is unusual to find any negative effects of music for early years' children.

When children are sung to, they are hearing and assimilating language which impacts their later language development. Significant advantages on language outcomes (vocabulary) were reported by Hahn et al, (2021) where parents reported high levels of singing to their babies; although the parents were the assessors of the amount of singing and receptive vocabulary, so this may have been subject to bias.

2.5 The Multifarious Nature of the Relationship Between Literacy and Music

So far, the individual elements which contribute to literacy success have been found to correlate with participation in musical activities. If each element of literacy success can be conflated and subsequently promoted through musical engagement, then engagement with musical activities should confer literacy benefits. It is possible that the vast array of benefits to be gained from musical participation may all contribute in some way to literacy proficiency.

There is plentiful evidence to suggest that the undertaking of musical activities by young children reaps many benefits (Sheppard, 2007). Children benefit in social,

communicative, physical, emotional and cognitive ways. Although the value of musical activities to literacy would seem to lie primarily in its close relationship with language and its ability to focus a child's attention on sound, it is possibly the all-encompassing nature of music and its ability to conflate many skills, deliver knowledge, provide an experience and environment which is conducive to learning and effectively train the brain, which is its most remarkable feature; like literacy, it is integrative by nature.

In the same way that seeking foundational contributors to literacy yielded quite a variety of factors, attempting to identify what is meant by a 'musical intervention', 'musical activity' or 'musical training' can be variously defined. It is not a simple task to compare like with like. The studies which seek to draw parallels between music and literacy generally correlate musical aptitude, musical experience and a variety of music skills or training to various literacy skills. By way of example, many studies refer to 'music training,' but what this training consists of varies greatly. 'Music training' can refer to a wide set of musical experience, for example:

- Schlaug et al. (1995) defined 'musically trained' as referring to professional classical musicians (players of keyboard or string or both).

- Magne, et al. (2006) described music training in eight-year-olds as having had '*3 to 4 years of extended practice in an instrument.'*

- Meyer et al. (2014) refer to half an hour of ‘simple music training’ but there are no further details of the training.

- In Bailey and Penhune, (2010), ‘musical training’ referred to the amount of instrumental, vocal or dance training an individual had received in their lifetime.

- In Slater et al., (2014) music training consisted of Harmony Project’s standard curriculum -1 hour twice per week – pitch and rhythm skills, vocal performance, improvisation and composition, awareness of musical styles and notation as well as basic recorder playing. Students then progressed to instrumental classes. They then had 4-5 hours of instrumental class per week.

- Overy, (2003) used two interventions which she described as ‘musical training’ - study 1 consisted of musical games based on rhythm and timing conducted over 15 weeks.

  – study 2 consisted of group singing-based music lessons of 20 minutes, three times per week.

- In Forgeard et al., (2008) music training consisted of 3 years’ minimum of instrumental training.

- In Standley and Hughes (1997) the musical element included singing, tapping a beat and moving to music.

- Anvari et al. (2002) used musical tasks which included melodies, rhythms and chords played on a piano.

Whilst many definitions of ‘musical training’ refer to formal instrumental tuition, others refer only to the use of music in the classroom, such as that of Fisher (2001), whose music in the classroom consisted only of singing.

Music training therefore refers to specific musical activities which are varied dependent upon the researcher’s choice, and reference to music training is usually accompanied by the amount of time a person has spent on this activity. The amount of time spent on musical activity may also influence its benefit to literacy. Gordon et al, (2015) found that at least forty hours were required improve rhyming skills through musical activities and that the results also indicated that rhythm training impacted rhyming skills as well as the rhyming activities alone. Bostelman (2008) conducted a program using rhyme and music which was found to benefit early phonological and phonemic awareness skills; this was over four months. Besson, et al. (2011) found that musician children who had had an average of four years of musical training were more sensitive to syllabic duration. Slater at al. (2014) found that two years, but not one year, strengthened skills in the brain that are important to language, whilst Slater et al., (2013) found that after one year of classroom music, children were better at keeping a beat. Additionally, each study uses different

measurements; some are general as in ‘attendance at music playschools’ (Putkinen, et al., 2015). Other studies measured specific elements of music, for example, pitch and rhythm (Douglas and Willatts,1994) or musical aptitude (Gordon’s PMMA test, 1979). The studies took place in different geographical regions or countries and on differing numbers and ages of participants.

In view of this variation in what is meant by ‘musical training’ or musical experience, it is barely possible to make comparisons between studies when they have such diverse definitions of the musical element of the study. However, it is possible to consider the musical elements included in all of the various definitions and examine the instruments of measurement used as these have greater similarity than the overall concepts of music. In studies where music ability, musical aptitude or musical perception have been measured, the main elements measured have been those of ‘pitch’ and ‘rhythm’. As mentioned previously, on page 99, melodies can be recognised with variance in timbre and dynamics but pitches and rhythms are what make music identifiable.

Similarly, the measurement of literacy skills against which musical experience is correlated covers a wide range of tests such as the DIBELS test, produced by the University of Oregon, the Peabody Picture Vocabulary Test (1981) and Wide Range Achievement Tests, Dyslexia Differential Diagnosis and RAN tests, for example.

This renders the studies not directly comparable and accounts for conflict in their findings, but it does augment the idea that any musical experience in early childhood may positively impact upon children's subsequent literacy development.

It may be that any musical experience is beneficial in some part to literacy development. It seems that this might be the case and evidence from Meyer et al., (2014) may offer a reason. They found that only half an hour of 'music training' (this consisted of making novel music sounds using an electric synthesizer) in students, increased the blood flow to the left side of the brain when music and word generation tasks were given. Prior to music instruction, only the right-hand side of the brain would have shown activity. In their study the music training caused the brain to activate both sides in order to undertake the tasks. The engagement of the left side of the brain is significant as this side of the brain is used when learning to match phonemes with graphemes as opposed to whole word reading, which engages only the right hemisphere of the brain. In trained musicians who listened and fingered short piano melodies, the areas of the brain which are active during speech perception and production (left hemisphere) were activated at the same time. For non-musicians, only the right hemisphere was activated while listening to the same musical stimuli (Evers et al., 1999).

In 2000, Butzlaff investigated the question 'Can music be used to teach reading?' He concluded that his meta-analysis of 24 correlational studies and six experimental studies assessing the relationship between musical experience and reading test scores showed that the relationship was '*neither large, robust or reliable*.' (p176).

This could well have been due to the variety of variables used. It is also of significance, that a person may learn to play a piano but may not be able read unless they are taught sound to symbol correspondence.

The correlational evidence put forward so far, however, presents a strong case for the role of music in early literacy learning. There is evidence that for every element of literacy learning, each can be promoted through some form of musical activity and this evidence is increasing as interest in this area intensifies.

The relationship between singing and reading is likely to show lower correlation than that of tapping syllabic rhythms in songs and tapping syllables in words, as, the latter are in effect the same and would therefore correlate highly. Both involve tapping the syllables in words but one has music added where the music itself indicates the emphasis of the syllables. The closer music and literacy are brought together, the higher the correlation between them. Integration of music and literacy activities is therefore most likely to offer the greatest benefits to literacy learning.

Research evidence (Bolduc and Lefebvre, 2012; Williams et al, 2015) shows that exposure to musical activities in preschool years can have a positive impact upon literacy; in addition to reading stories (Williams et al, 2015). Musical behaviours relate to society and culture; songs tell stories. In the same way that Fröebel's songs promoted the learning of curriculum content, children's songs can be informative, introduce new vocabulary and offer a form of social stories. Musical listening can help to foster children's listening skills as they focus on lyrics or parts of the melody.

Children may listen for their favourite part or join in when the lyrics are repetitive and easy to remember. This necessitates children listening for cues and attending carefully to the sounds and patterns of the song. The music that a family listens to may also influence a child's perception of the world as they appropriate the same feelings towards it as their parents. The extent of a child's music practices will often be dependent, as with language upon early exposure, reflective of that of parents or of early childcare settings. Each child's individual experience of music and literacy varies extensively, further discombobulating the relationship between music and literacy.

2.5.1 Integration

From the literature, it can be discerned that where musical activities have been integrated into literacy programmes with the intention that they support and facilitate the development of literacy learning, then this is where there is greatest impact. The mere delivery of a music program alone, although conferring a wealth of benefits, is not sufficient to promote the development of early literacy skills. Where there has been intention to promote literacy outcomes, then these have had most efficacy.

Where the impact of musical activities upon literacy learning has been examined but differing aspects of music and literacy learning that do not have a high correlation have been compared, then the impact is not so great. Singing songs and rhymes for example, whilst worthwhile activities alone, have more to offer when integrated as part of a literacy learning programme which deliberately links them

with literacy outcomes. For example, songs could be used to extend vocabulary and to ensure comprehension if a discussion was held about the lyrics of any songs sung. Children could physically tap or clap along with a rhyme to emphasis the syllables; or a teacher could emphasise initial letter sounds in alliterative rhymes and ask children for more matching examples; similarly for rhymes. Such use of musical activities helps to promote important literacy skills.

Musical activities can have the greatest impact upon literacy learning when aspects of music and literacy which share commonality and therefore have greater correlation are used together for a specific literacy purpose. For example, in Verney's study (2011), he asked children to tap out the rhythms of the names of various toy objects on chime bars, thereby fostering the development of the skill he wanted the children to develop (syllabification) using musical stimulus (chime bars). Tuning a child's ear to the rhythms in words will help them to be able identify the syllables in words as rhythm correlates highly with syllabification as overlap is great.

In 2005, Gromko wanted to show that a near-transfer hypothesis could explain the relationship between music instruction and phonemic awareness. She showed that music instruction which emphasised the development of aural perception led to significant gains in the development of phonemic awareness. The weekly music instruction in her study included singing, body percussion, movement, word rhythms, beat, pitch, melodic contour and the use of graphic shapes to represent sounds. The results of this study supported a near-transfer hypothesis that active music making and the association of sounds with developmentally appropriate

symbols may develop similar cognitive processes to those needed for segmentation of a spoken word into its phonemes. The music treatment was based on Bruner's theory of cognitive development, whereby children are able to construct images through their active experience. The association of sound to symbol was made explicit as children touched a graphic chart of word rhythms or lines to represent melodic contour. This skill was easily transferable to letter learning as children had learned how to 'read' the symbols, they learned the direction of print and that the print conveyed meaning. Hodkinson et al. (2008) disputed the idea of transfer and considered that this infers that something learned is then static, which they argued it is not; learning is dynamic. They would suggest in this instance that the children in Gromko's study would have drawn upon their musical learning to suit the requirements of later literacy learning. The children in fact were able to use a skill they had developed in one situation and apply it in another.

Using Patel's OPERA hypothesis, Tierney and Kraus (2014) offered a further hypothesis, the 'Precise Auditory Timing Hypothesis' (PATH) to explain cross domain enhancement of music training on language skills. They argued that auditory-motor timing is an acoustic feature which meets all five of the pre-conditions necessary for this enhancement: music and language use the same neural networks to process timing (Overlap), keeping in time to music requires precise timing (Precision), keeping in time to music capture emotion (Emotion), keeping in time to music requires repeated practise (Repetition) and also requires focussed attention (Attention). The PATH predicts that musical training which

emphasises entrainment will be particularly effective in enhancing phonological skills. Here, auditory and motor skills are combined.

Overy, (2003:6) conducted a study on dyslexic children and found that learning to tap a rhythm to a song could be an effective learning tool in the development of syllable segmentation skills and subsequent spelling skills. She also identified that dyslexic children have musical difficulty with rhythmic motor skills and rapid auditory processing skills, these weaknesses were reflected in their rhythmic and rapid aspects of language processing. In two studies by Overy, phonological and spelling skills were significantly improved after musical training. Although a causal relationship was not demonstrated, the results supported the hypothesis that the potential transfer of musical abilities to language abilities could be facilitated by temporal processing. Overy drew parallels between singing and phonologic development and reading music and reading text. Where these skills are drawn together less transfer is required. The combination of auditory, motor and language skills would seem to further assist learning.

The closer that areas of commonality may be brought together from music and literacy learning, then, the more the need for transference or the building of one on the other is reduced as they become one and the same. Where there is greater overlap in skill areas then the need for transference is obviated and children may gain the skills and knowledge required through experiencing integrated activities.

Action rhymes and songs naturally combine auditory, motor and language skills, and such activities are often part of early learning programmes. Mothers sing lullabies to babies and speak to them in sing-song tones. Bolduc and Lefebvre (2012:500) conducted a longitudinal study of the impact of rhymes upon PA and encouraged preschool teachers '*to go beyond the recitation of nursery rhymes'* by adding language activities to enrich the learning context. Merely singing songs and rhymes will not have as much impact as explicit instruction on the outcomes that a teacher is aiming to promote.

Music integrates naturally with language and children readily participate in musical activities, acquiring many skills therefrom. Music offers a learning medium which is very natural to children. The evidence so far suggests that whilst music can be a subject on its own it may also be used as a conduit for other areas of learning. In addition to using music for the sake of musicality, early years' sessions which use music to explicitly promote foundational literacy skills could offer an ideal pedagogical opportunity and 'could maybe partially offset some of the negative impacts of linguistic deprivation' (Slater et al., 2014).

Music and early literacy learning have many common elements; when these are purposefully conflated to promote literacy skills, then the benefits should be greater than either alone. The skills and knowledge identified earlier as being prerequisite to literacy have many points of convergence with musical activities, as illustrated in the following table:

Figure 5.

Musical and Literacy Conflation to Promote Early Literacy Skills

Music	Areas of Convergence	Early Literacy Skills
Musical activities promote auditory awareness and discrimination	**Language** Listening Auditory discrimination	Discrimination of the sounds in words is pivotal to literacy
Musicians good at SiN	Speech-in-noise (SiN)	Ability to hear in noise
Singing promotes fluency of speech	Speaking	Spoken language is predictive of reading
Songs can help to build vocabulary	Music and language are innate to humans	Good vocabulary required
Prosody in music	Prosody	Prosody in language
Rhythm Sound patterns Pitch	**Phonological Awareness** Awareness of and discrimination of sounds in large and small grain sizes	Syllabification Onsets and rimes Phonemic awareness
Graphic notation Symbol recognition Supports visual skills	**Mapping Sounds to Symbols** Symbols convey meaning	Concepts of print Recognition of letters and words
Music stimulates the brain Music-based strategies aid comprehension	**Cognition** Comprehension	Text needs to be understood
Music training improves attention	Attention/focus	The ability to focus on a task affects learning
Music is an effective way to learn sequences	Sequencing and prediction	Deficit is predictive of poor reading
Music promotes fluency	Rapid Automatised Naming	Predictive of reading fluency
Music enhances memory retention and recall	Memory	Memory is vital to literacy
Music is motoric	**Movement** Movement stimulates the brain	Movement supports learning (kinaesthetic)
Music is engaging for young children	**Motivation**	Motivation promotes learning
Additional benefits: Music causes the brain to release dopamine – this increases pleasure, motivation brain function, decision-making, plus assists movement and reduces anxiety. Repetition (which embeds learning) through music is enjoyable – as opposed to drill. Music is a holistic learning medium and provides a means of integrating many disciplines. It is also inclusive enabling access at various levels.		

There is little doubt that some of the skills required for literacy can transfer to or be built on those gained from participation in musical activities for many children. Many correlational studies attest to this, Anvari et al., (2002), Peynircioglu et al., (2002), Zuk et al. (2013), and Forgeard et al. (2008).

Tierney and Kraus (2013a) also argue for the inclusion of music training as part of the curriculum. They suggest reasons for the benefits derived from musical training are that music is rewarding, emotion-inducing and attention-grabbing. Motivation and attention can enhance neural plasticity, and this can subsequently enhance learning.

The seminal work of Douglas and Willatts, (1994:107) recognised that a musical intervention alone is not enough to facilitate the promotion of all the skills necessary for literacy success and stated that '*It may be that a musical intervention in combination with other types of intervention may be even more effective than focusing on one single area.'*

Studies which have demonstrated that using musical stimuli for the intentional promotion of early literacy skills (as opposed to a by-product of musical activities) by the use of integrated materials are few. Some of them are detailed below:

Peynircioglu, et al., (2002) correlated the deletion of initial or final notes in a musical phrase with the deletion of initial or final phonemes. Again. these are similar tasks requiring auditory awareness and perception. This showed that using musical activities in this way could promote the skills required for success in identifying phonemes in words. Lamb and Gregory, (1993) also showed that awareness of pitch was related to phonemic awareness. Other studies have not found correlation between the undertaking of musical activities and phonemic awareness but did not specifically correlate pitch with phonemic awareness (Forgeard et al., 2008 and

Degé and Schwarzer, 2011). It could be that it is not the change between pitches (higher or lower) which helps children to determine differences in phonemes, but the awareness of change in the sound itself. There is no change in pitch between the phonemes in the English language. An awareness of change in the sound of a pitch would help to foster awareness of change in letter sounds but not the pitch itself. Degé and Schwarzer, (2011:1) suggested that *'the categorical building blocks of language (eg phonemes) should be related to the categorical building blocks of music (eg pitches/notes)'*.

Another early study from, Standley and Hughes, (1997) designed and delivered, two, 15-session (twice per week), music programmes which were designed to enhance the pre-reading and writing skills of four-to-five-year-old children who were enrolled in inclusive Early Intervention and Exceptional Student Education programs. One was delivered in the fall to teach writing skills and one in the spring to teach reading skills. The control was the regular sessions without music. Although it was described as a musical curriculum, the two programmes were each designed to promote reading or writing skills. The musical activities included alphabet letters names and sounds, language instruction, stories, visual awareness, word recognition, children's literature and spontaneous writing and the combined use of text with spoken/sung language activities, singing and phonics in a print-rich environment. The results demonstrated that '*the more focused the music activities were on a specific skill, the more effective they were in teaching print conventions and writing skills as intended'* (p5). This demonstrates the importance of focussing the activities on the required outcomes. The outcomes in

this ‘musical’ curriculum were literacy outcomes not musical. The music curriculum also incorporated language skills, number concepts and promoted appropriate social behaviour and the structure of the lessons accommodated a variety of learning styles to enable all participants to be successful. The curriculum design was based upon music therapy techniques allowing specific teaching techniques to meet individual pupils’ needs. In addition to significantly enhancing print concepts and prewriting skills the researchers reported that the music activities were enjoyed by the children which possibly lead to long term motivation for further academic progress. Music and literacy activities were very much integrated.

This study was replicated in (2001) by Register with a larger sample size (n=50). According to Register, implementing a music program centred on the development of pre-reading and pre-writing abilities could provide another venue to teach critical skills before the beginning of primary school.

At the same time, Fisher (2001) examined whether or not using music in KG and primary grade resulted in increased literacy performance and examined how the music was used. Observations took place over two years in bilingual classes of Spanish children. The teachers using music (2 out of 4) used music as an instructional material for literacy. Music was incorporated into the day, starting with a song. The songs focussed on self-esteem, pride and feeling good. The music-enhanced classes related literacy activities to song lyrics for example. One activity involved the creation of smaller words out of one long word; the word related to a song which the children subsequently sang. This was found to be motivational as

the children wanted to hear the song. There were books with songs with accompanying CDs so that children could follow the words in a reading corner. Children were observed to ‘hum’ as they worked. Fisher, (2001:47) referred to the way in which teachers infused music into their literacy instruction. He wrote that the music complemented the instruction. He also suggested that the addition of music should be thematically or developmentally tied and was unsure there would be a positive impact on student achievement if this was not the case. Concluded from the study was that music (in this case, singing) had a positive effect on oral language and reading scores.

Similarly, in Bolduc’s specific interdisciplinary programme (2009) based upon the one used by Standley and Hughes (1997), children analysed lyrics, composed rhythmic counting rhymes, and used graphical notation as an introduction to early reading skills and to gain meaning from symbols. Children matched sounds to symbols and learned print direction. Phonological ability improved for the five-year-old children in the study after undertaking one-hour sessions each week over fifteen weeks. Music education was a major facilitator in the emergence of literacy skills but also when the programme was interdisciplinary then this was held to have greater benefit upon early literacy skills than a general music programme.

Register, et al. (2007) showed that children with disabilities made significant gains in reading comprehension and showed heightened attention when musical activities were integrated with storytelling. They used puppets and songs to engage children and to reinforce the reading of a story from a book. They reported that the song they

used with the story helped the children to process the events in the book and enabled them to make predictions. They concluded that musical programmes which specifically address literacy outcomes are most effective at promoting literacy outcomes.

Wiggins, (2007) is a strong advocate for the integration of literacy experiences with meaningful music activities. Her article in the journal 'Early Childhood Education' suggests that children can learn through singing and performing the plots of stories after they have been read. She draws parallels from songs, rhymes, vocalising, vocabulary and sentence construction, sequencing, communication and singing games between music and literacy learning.

Kouri and Telander, (2008) compared story comprehension and narrative re-tellings of sung stories and spoken stories in children with a history of language delay. They found that the use of music affected the quality of lexical usage in story re-telling. They suggested that music may have facilitated recall and memory for story vocabulary through the melodic presentation of the story text. They also referred to research of Colwell (1994), who found an enhancement in children's reading, pre-reading and general attention levels when music and literacy activities were used concurrently.

Verney, (2011) showed how songs and nursery rhymes could be used to increase the PA skills of rhyme and syllable awareness in a nursery classroom for 4- and 5-year-olds. He also showed that if music is used as a stimulus, then musical

experience will make a greater impact than without it. By integrating musical strategies into literacy learning this impact can be increased. Verney also conducted an intervention designed to investigate whether music or ‘rhythmic speech’ would lead to improved PA skills. He found that the rhythmic speech programme was more successful in improving PA skills for a group of ninety children.

Verney’s research showed that it is not the music ‘per se’ that causes the effect but the literacy element which teaches the literacy output. No difference was found between the intervention with music and the one based on rhythmic speech. It was the intervention itself which promoted the learning. Moyeda et al., (2006) found the same.

Verney, (2011) and Fisher, (2001) both believed that it is not the music that maximises the benefit but the combination of music and literacy together; in effect it is the synergy of the two which creates maximum impact upon literacy learning.

There is further support from Frasher, (2014) to support the integration of music into the literacy classroom. She suggests the use of finger plays, singing, singing games, poems and stories that include rhyme, rhythm and alliteration. She proposed that music specialists, reading specialists and general classroom teachers should work together to produce music and literacy programmes.

Whilst correlations have been found, for example between, rhythm and syllable segmentation, rhyme and melody and pitch and phonemic awareness, causality

cannot be proven. The reason for this is possibly that the skill areas required for literacy – auditory awareness, cognition, motor, visual and language, are very much intertwined, inter-related and interdependent. The identification of individual aspects of music and literacy and their correlation, whilst contributing to the understanding of the relationship, does not take account of the inter-relatedness of all these aspects.

Although there are materials produced by musicians which promote the use of musical activities to support literacy skill development, there is little from a literacy perspective. There is a dearth of published books to explain the relationship. Hansen, et al., (2004 and 2014) and Kay, (2013) provide two such books. Hansen's book focusses mainly on primary school teaching, whilst Kay's book focusses mainly on preschool learning. Both seek to elucidate the relationship between music and literacy learning and offer suggestions for practice. By integrating music and literacy activities, music can be used as a vehicle through which to implement literacy objectives.

Recurring themes from researchers who have integrated music and literacy learning are that the musical activities provided motivation for the children; they enjoyed and were enthusiastic when learning through music. Social factors have been cited as contributory to learning, as have the engaging, rewarding and emotion-inducing nature of musical activities. The ability of music to support repetitive learning in a fun and compelling way assists the learning process. The holistic nature of music enables it to be naturally integrative, it is also naturally

inclusive and musical activities can help to provide unobtrusive literacy experience. Much of the research into early musical activities seeks to examine the effects of music and factors other than music, such as those of Ruokonen et al. (2021) who found that music enhanced the pedagogical environment for young children and Zachariou et al. (2023) who examined the effects of musical play on children's self-regulation and metacognition, for example.

The evidence presented here explains to some extent the relationship between music and literacy as it shows that all musical activities may be able to impact upon all literacy outcomes at some point and to some degree, if an effort is made to do so. Conversely, musical activities alone will not automatically confer benefits to literacy learning, although there may well be a transfer effect for some skills.

There is a plethora of evidence supporting the relationship between music and language. Hence singing songs can contribute to language development which will subsequently impact upon literacy. However, singing or playing an instrument does not in itself facilitate the ability to read, write or comprehend text. Research suggesting the use of music to promote literacy is generally from musicians, music therapists or psychologists. There is little research to indicate how music and literacy learning can be fused together by early years practitioners, other than the few examples above.

2.6 Conclusion

This research was undertaken in Scotland under the auspices of the Curriculum for Excellence. Children in deprived areas are more at risk of lower speech and language ability, which subsequently impacts literacy acquisition and age three to five years is an age when language development can possibly be enhanced; hence this research was situated in an early years' centre with a high index of deprivation in order to benefit children who might have the greatest need. Children's home environments in such an area are often lacking in literacy rich experiences, which is something that can be compensated for to some extent, in childcare settings. Inequalities in development at age three years can persist throughout life and a gap in attainment which starts in the early years widens throughout school life in most cases. Hence, this is an important stage when a difference can be made.

Much of Fröebel's philosophy is relevant to this research, the use of music as a learning vehicle, the provision of an appropriate environment, his use of learning through playing and activity which is relevant to the child, the belief that children should be nurtured and that all aspects of a child's development are important and contribute to overall learning. Vygotsky's advocacy of scaffolding also guides this research and Bruner's concept of a spiral curriculum, and that learning is a continuum. An interpretivist approach to investigate how children construct learning, is most suited to this research which uses qualitative methods to examine how music and literacy learning converge in the form of songs, rhymes and musical activities from a sociocultural perspective.

As evidenced herein, the development of literacy skills is not the product of any one particular experience, singular skill or item of knowledge, but a coalescence of multiplicities. The main areas which affect literacy development have been identified as - environment and experience, (concepts of print and visual skills), cognition (comprehension, attention, sequencing and prediction, RAN and memory), language (receptive and productive), prosody (intonation, rhythm and stress), phonological awareness (at the level of syllable, onset-rime and phoneme) and sound to symbol correspondence. Motor skills, timing and motivation are also impactful. A child who is competent in all these areas is one with the best chance of literacy success upon school entry.

Pivotal to the ability to match phonemes to graphemes, identified as the most important skill in literacy proficiency, is the capacity to be aware of sounds in language. This requires the motivation and capacity to attend to sound. Musicians tend to have such capacity and are more able to detect nuances in sound, due to their training, and are also more able to detect 'speech-in-noise', the ability to focus their attention on the sounds they want to hear in a noisy environment. Hence, the implementation of a musical intervention which specifically focusses on literacy skills and particularly, language skills, would be propitious.

The value of music as a learning tool for young children cannot be understated; it stimulates both sides of the brain (Slater et al., 2014), benefits speech processing (Patel, 2014; François et al., 2013), increases attention (Dewi et al., 2015), assists with memory recall and enhances detection of 'speech-in-noise' (Parbery-Clark et

al., 2009), improves auditory skills (Putkinen et al., 2013), induces happy feelings and helps to engender a sense of achievement (Salimpoor et al., 2013) and induces a relaxed and therefore suitable learning state (Thoma, 2013). Each of these factors support early literacy learning and additionally each of the factors identified as important to literacy have been shown to be positively influenced by musical activities. Thus, music helps to foster an ideal learning environment and is an excellent vehicle for the promotion of early literacy skills and knowledge acquisition.

Music has been much credited in assisting literacy learning and there is a wealth of evidence to attest to the value of music in promoting early literacy skills. Whilst Darrow (2008) asserted that '*Music Teaches Reading*,' – more metaphorical than scientifically based - Butzlaff (2000) had earlier found insufficient evidence to support the hypothesis that 'music can teach reading' and reported that his results could not explain what underlies the associations. Maybe it is not music 'per se' (Verney, 2011) which is responsible for literacy learning but that it 'adds' to the effectiveness of literacy learning. For example, learning to tap rhythms to music is correlated with an increase in literacy ability (Slater et al., 2013) but in fact it is the ability to tap syllables in words which is responsible for improvements in literacy; the ability to tap rhythms in music 'transfers' or secures learning on which to build new learning of the tapping of syllables in words. If this transfer effect or need to build upon previous learning could be obviated by integrating music and literacy together then this may lead to an increase in effectiveness. Additionally, where music is used as vehicle for literacy learning then the benefits of music are also conferred. Bonacina et al. (2015:7) suggested that '*a combination of music and*

reading training seems a promising strategy for improving reading skills in students with developmental dyslexia,' and pointed to a lack of understanding of the role of music in reading enhancement.

Tierney and Kraus, (2013a) suggested that musical training benefits the acquisition of language skills and subsequently reading ability. They identified five subskills which underlie reading acquisition – phonological awareness, speech-in-noise perception, rhythm perception, auditory working memory and the ability to learn sound patterns. They determined that '*Musical training can provide an effective developmental educational strategy for all children'* (abstract). If musical training itself can support the acquisition of these subskills, then a literacy intervention which is intentionally focussed on this acquisition and other foundational literacy skills, but delivered through musical activities, should in some way be superior to a literacy or music intervention alone. This research seeks to investigate such an intervention.

Whilst there is evidence that a relationship exists between musical training and literacy skill acquisition, Tallal and Gaab (2006) stated that ''*It remains unclear why and how musical training might improve language and literacy skills*.' It remains unclear also whether all children would benefit from music training to embed literacy foundations and if combined approaches would be most beneficial (Bhide et al., 2013). Whilst some children seem to have natural rhythm, others do not and according to Bharathi et al. (2019) might benefit from training. This research may further elucidate whether literacy-through-musical activities could promote rhythmic training in young children. Thompson (2021) suggested that auditory maturation

may not develop in some children until the age of eight years. Through a literacy-through-music program it may be possible to observe whether or not sound awareness is developing and whether such a program could support its development. Corriveau et al. (2010) considered that an intervention targeting rhyming could bolster pre-reading skills; it might be possible to observe whether children's ability to rhyme improves through an integrated program. Similarly, Bolduc and Lefebre (2012) suggested that complementing nursery rhymes with musical activities would seem yet more powerful than rhymes alone and that further research to clarify the relationship between language and music is required.

The literature examined in this review comes from musical, psychological and cognitive neuroscience viewpoints. There are studies from music therapists who are involved in literacy teaching and from educational psychologists, but not from a literacy teacher perspective. Pauls (2012) noted that with the exception of Douglas and Willatts (1994) all authors of the studies she reviewed were music therapists or music educators. She suggested that work in this area would benefit from collaboration with researchers with expertise in language and reading. She also suggested that '*more research is needed to determine the type of music program that most effectively supports the development of literacy skills.'* (p5). Rautenberg (2015) also suggested that studies to examine the use of musical training for improved reading and writing ability would be fruitful to undertake.

As the research in the area of literacy learning through music is generally confined to quantitative studies; a qualitative study would offer further insight into how literacy

learning may be impacted through an integrated literacy-through-music intervention. This would serve to inform early years' educators of how such a program could be advantageous to their practice, provide reasons for integrating music and literacy learning and offer suggestions as to what activities might be most beneficial.

This research therefore sought to examine how a literacy-through-music program could be designed to best promote foundational literacy skills for four-year old children (average age) utilising activities which combine music, language and movement. Having designed such a program, the researcher then sought, through observation, to determine the extent to which the program was effective in promoting foundational literacy outcomes, to determine which activities were the most effective in achieving literacy outcomes and to investigate any possible underlying mechanisms to which the achievement of these outcomes could be attributed.

Using action research as an investigative methodology, enabled action to be taken whilst the intervention was ongoing in response to the participants and their needs and preferences. Additional questions were expected to arise as suggested below:

- Was there any evidence of improvement in sound awareness?
- Were there any other observable outcomes other than the focus skills and literacy competencies?
- How did the presentation of the program differ from a music program?

- Did the presenter exhibit any particularly good or poor practices?
- Were there any negative outcomes of the program?
- How did children respond to the program?
- Would it be possible to identify children at potential risk of literacy failure through the program?
- Could the program be considered worthwhile?

Research into the possible role that music can play in literacy skill promotion is increasing. This research aims to build on extant research and to investigate how best an integrated music and literacy program can be used to intentionally and explicitly promote early literacy skills and provide rich and engaging experiences which will support the emergent literacy continuum. It also aims to investigate what is happening during the intervention in terms of behaviour and response and to improve understanding of the relationship between music, literacy and movement for young children, by seeking possible reasons for any behavioural changes during the learning process.

CHAPTER THREE - METHODOLOGY

3.1 Research Method

The chosen research method for this research is ethnographic, capturing participant learning through observation as it happens in a natural environment with the researcher as a participant observer. The researcher participated in a teacher role (although referred to throughout as ‘presenter’ (P) to differentiate her from the ‘teacher’ (T) and ‘teaching assistant (TA)’ in the room. The researcher observed the sessions through later examination of the recorded video footage to collect qualitative data. This method enabled the researcher to develop a deep and holistic understanding of what was happening whilst participants were taking part in the intervention.

Recorded observation was the chosen method of data collection as observation allowed the researcher to examine behaviours and listen to what the participants said and did, in response to the activities undertaken in order to search for answers to the research questions. Lankshear and Knobel (2004:219) stated that recorded observations:

> *‘generate richly detailed accounts of practices rarely obtained through interview alone and can provide deep insights into social practices, events and processes.’*

Whilst a teacher is teaching, or even observing another teacher, there is only so much they may take in at one time. By using video recording the observer was able

to watch repeatedly to examine each scene more closely and could observe each child at one time, which is not possible in a real time scenario.

The study is a quasi-experimental study as it involved a randomised selection of half of a class. In accordance with epistemological principles, the data collected must be relevant, valid and reliable and must be consistent with the conceptual and theoretical position adopted for the study (Lankshear and Noble, 2004). The participant sample was relevant to the research questions and the intervention has external validity as it is able to be replicated with similar groups. With a different set of participants however, the data may reveal differing results as the participants cannot be identically replicated as every child is different.

Internal validity was attained through objective transcription of the video footage. According to Pink (2001) the process of visual ethnography may be ambiguous and prone to subjectivity, so steps must be taken to ensure validity. Taking cognisance of this, the researcher transcribed the videos to report only what could be seen and heard, such that any other person would be able to see and hear the same without any analysis of the situation taking place. The data is therefore able to be verified. The data is reliable as it was from an original source, the same questions, raised by the literature review were consistently applied to all participants and the data was free from bias.

The research is consistent with the conceptual and theoretical framework as it was undertaken in a naturalistic environment, through musical activities, where children

are learning through doing, (a learning activity much used by Fröebel) and via a curriculum which is spiral in nature (repeating activities, adding new ones, then reviewing previous ones again, as in Bruner's Spiral Curriculum) and children were able to construct their knowledge and build skills progressively, in alignment with constructivism.

Action research was used for this project as it was an enquiry conducted by the researcher into their own area of work, although not at their place of work. It seeks to further understanding of practice such that the researcher and others may be able to improve early years practice with regards to the possibility of offering an environment and activities through which children can enjoy early literacy skill promotion through musical activities.

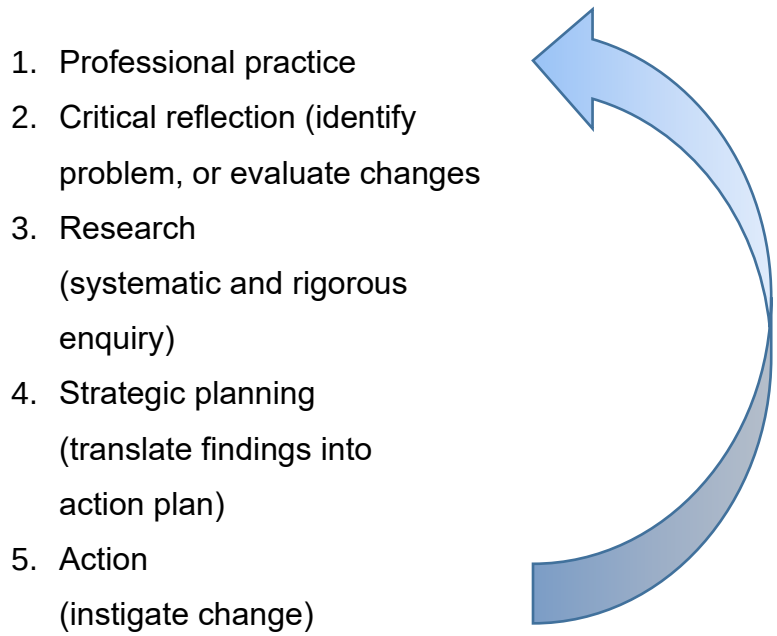
Action research offers a methodology which recognises the interconnectedness of all things and enables people's values and beliefs to be considered as important to planning and outcomes. This research aimed to examine the interconnectedness between skills required for music and skills required for literacy and to investigate how musical activities may help to foster skills required for literacy and if this is possibly the case. It examines how children interact with the environment, people and 'tools' within it, in this case, when an environment is created for the purpose of literacy skill promotion through musical activities.

Denscombe (1998) offered an Action Research Model (in Costello, 2007:11), see Figure 6. As per the model, in the case of this research, the professional practice

is the offering of activities which may promote literacy learning (1). The critical reflection (2) is the identification of dissatisfaction with the current incidence of poor literacy. Research (3) is the examination of research that has taken place with regards to using music to promote literacy. The current action plan (4) is the design and implementation of a literacy-through-music intervention and possible proposals for change (5). This process then restarts with reflection upon the intervention and evaluation of its impact.

Figure 6.

A representation of Dunscombe's Action Research Model



Action research is practitioner-based research which is self-reflective (McNiff, 2002) examining how practice may benefit others. In this case it was used to examine a literacy-through-music intervention to gain understanding of how children may possibly gain pre-literacy skills, through musical activities and to investigate how

literacy-through-music may be used as a viable pedagogy and to further the understanding of such a learning process where this pedagogy is used. Cohen, et al., (2011:345) refer to their earlier definition (1994) of action research as '*a small-scale intervention in the functioning of the real world and a close examination of the effects of such an intervention.*' Action research is a practical method of research, situated in a real environment and through which others may learn about their practice. It is suited to this project as it enables the researcher to be part of the enquiry; it is open ended and allows ideas to develop from the data gathered and it can be undertaken by a research-practitioner in a natural environment. Action research was influenced by Stenhouse who believed that the curriculum should be meaningful and relevant to students' experience (as determined also by Fröebel, 1895a) and promoted the idea of 'teacher as researcher' (McNiff, 2002). In this enquiry action research was used as a way of gaining understanding of a particular pedagogy. The interpretivist investigation was objective in data analysis, such that the data informed the researcher.

Costello (2007) pointed to comparisons with quantitative types of research and stated that qualitative methods must be subjected to the same rigours. He highlighted as potential areas of weakness in action research, the concepts of validity, reliability and generalizability and suggested strategies to mitigate these, identified by Robson (Robson, 2002 in Costello, 2007:45) including:

- prolonged involvement in the study – weeks or months;

- triangulation – using multiple methods of data collection or more than one observer;
- negative case analysis – note instances which disconfirm the researcher's ideas or theories;
- audit trail – keep a complete record of research – questionnaires, interview transcripts, video and audio tapes and research diaries/journals.

This research meets these criteria as it was undertaken over a six-week period and instances were noted where musical activities may possibly add a negative impact upon the participants. Triangulation in this case would not have benefited the research as the purpose was to examine what could be observed so other methods of data collection would have been obsolete. It was not possible to have other observers as the videos took months to transcribe, so this was not practicable. All documents relating to the research were kept.

This research aimed to 'replicate' the role of a teacher in a classroom and record teacher and pupils' behaviour over time. As the sessions were recorded there was no need for more observers as the recordings held the data, which could be viewed by others for validation purposes. The researcher considered the possibility of collecting further data from parents and from the children by additional questioning for the purpose of triangulation. However, after discussion with the head of the centre and the school head, it was decided that this would put unnecessary pressure on parents and participants, so was rejected.

The methodology is a combination of naturalistic enquiry and participant observation as the intervention took place in a ‘natural’ school setting, undertaking what could be a typical part of a school day, similar to a musical session. The researcher assumed the role of a teacher, which was a familiar one for the children, although the researcher herself was initially unfamiliar to them. The children were used to visitors. There was at least one familiar staff member (teacher or assistant) also present with the children at all times. The aim was for the conditions for the research to be as natural as possible to allow for children’s usual behaviour and receptivity and to not cause any anxiety.

3.2 Research Design

The research design was a micro-ethnographic one in terms of providing a portrait of children’s learning on a small scale. Although the investigation could relate to any group of young children; it was conducted with a group of children in an area of high social deprivation in Scotland. It therefore took cognisance of the socioeconomic influences upon the participants of the study. This research may also be termed ethnographic in terms of its attempt to seek further understanding of how children learn and of their relationship with literacy and music. Music making is a recognised component of early years learning, yet it is often dependent upon the skills or inclinations of the teachers available. This research did not aim to offer a musical intervention for the purpose of music making or any musical outcomes but sought to investigate how a musical intervention could be used for the promotion of literacy outcomes and to investigate underlying mechanisms which may evidence that this

is possible. The relationship between music and literacy was the focus of the research and how this relationship could possibly influence children's literacy outcomes.

Although delivered through musical activities, the intervention was a literacy intervention, aiming to promote foundational literacy skills. The 'embedded-explicit model' of literacy intervention design from Justice and Kaderavek, (2004) which seeks to integrate practices associated with both embedded and explicit orientations was used as a preventative framework for conceptualising the delivery of emergent literacy interventions for young children at risk of later reading difficulties and was therefore an idea model to use for this research. An embedded orientation is where learning is organic, and children interact with literacy materials throughout their day. This research, whilst recognising and including literacy materials, had a strong focus on sound, hence the interactions were focussed on sound. The children were interacting with sound-oriented activities which were embedded in the intervention. Explicit orientation often includes the decontextualized teaching of explicit aspects of literacy such as phonemes, PA and alphabetic code. Hence in this intervention, such aspects of literacy were contextualised within the intervention. Children were offered explicit instruction in relation to sound, through embedded interaction with text, instruments, pictures and props; the literacy teaching was contextualised within the activities.

An example of explicit orientation was when children were asked to beat out syllables in words on a drum. Although the instruction was of explicit orientation, the

learning was embedded in the activity, being contextualised by the child's choice of word to choose to beat and in the context of a musical activity, using a beater and a drum as learning tools.

The research design was cognisant of the possible weaknesses highlighted by Costello (2007) and endeavoured to overcome them by engaging in a study over six weeks and the undertaking of negative case analysis. Similarities and differences were noted in children's relationships with the activities and learning behaviours. The research took an etic perspective in terms of examining the data initially in light of the theoretical framework; however deductive reasoning was not used as an approach as it was not testing a hypothesis. The research is emic in terms of analysis of the data as it aimed to find something new from the data which would arise 'bottom up' from analysis of the children's experiences. Hence inductive reasoning was the approach used, aiming to find explanations of why and how the intervention employed could be effective in terms of promoting the development of skills which would ultimately contribute to literacy success.

3.3 Research instruments

An intervention was devised in order that its impact could be analysed over time. The sessions were recorded with video in order that observation could take place at a later date.

In discussion with the Centre Head and the Head Teacher of the adjoining school, it was decided that children would be the most non-invasive videographers. Rather than using static cameras, the child videographers would be able to move around as the children participants moved and the young children being videoed would not feel threatened or anxious by their presence, as they might if an adult was operating a camera. The Head Teacher of the primary school agreed to send various older children to record each session. These children were asked to volunteer and if they were able to take video using an iPad. They were subsequently given instructions on what to do. Cameras were placed as much as possible, such that each individual child was recorded for later comparison to examine the behaviour of each child over the duration of the sessions.

There was no triangulation as it was not felt that this would add anything to the research. As the investigation was to examine what happens in the group there was no need for external information to be added. The purpose of the intervention was to see what could be observed, not what could be tested. Although initially an assessment was going to be administered; it was decided that it was not worthwhile and would add undue pressure on children and staff.

3.4 Procedures

Initially the teachers spoke to the children selected and asked if they were willing to participate in the study. The details and purpose of the study were explained. Permission in writing was collected from parents (refer to Appendix 1). It was

intended that the intervention be conducted daily over six weeks, however, due to various circumstances the school was closed on some of the days and other events took precedence so, instead of the planned thirty sessions there were only twenty-four.

Initially, there was a planned screening to take place at the beginning and end of the intervention; however, the Centre Head decided that she did not want this to go ahead due to time constraints. The researcher respected her wishes and was able to assess the children by observation of the recorded video footage.

All sessions were recorded by video, but not always the full session as sometimes the child videographers arrived late or had to leave before the end. All videographers were thanked for their help at each session and at the end of the intervention all participants were thanked.

Disadvantages of using un-professional videographers meant that not all sessions were fully recorded, not all children were on camera for every activity and sometimes there was no sound. However, the advantages outweighed the disadvantages as the children were unperturbed by the video being taken, which was much in keeping with wanting to keep the sessions as natural as possible and in accordance with SERA (2005) ethics requirements.

3.5 Timing

Each session was planned for thirty minutes as this was regarded as a reasonable time for children to be engaged at one time in a range of activities and to be removed from their regular class. Thirty, thirty-minute sessions were planned with flexibility to vary the activities and time dependent upon participant enjoyment or dislike of any particular activities. Occasionally, the sessions finished earlier than planned, but more likely was that they went slightly over the thirty minutes. Due to various other events and school closures twenty-four sessions went ahead and were recorded.

3.6 Time Scale of the Project

It is important that the right amount of data is collected for a study, as purported by Lankshear and Knobel, (2004), the collection of too much or insufficient data is wasteful of time. In order to allow a reasonable amount of time in which to observe behavioural change a period of six weeks was proposed. This period of time represented half a term which was flanked by a holiday at both ends and hence offered a period of time without gaps where learning could be continuous and gave a natural beginning and end. This time period would also be interesting in offering information on what might be able to be achieved in this set period.

The sessions began each morning after a register had been taken in the class. The sessions were held daily, except on days when the school was closed, or other activities took precedence.

3.7 Participants

3.7.1. Sampling Strategy

The sample was randomised in that it could have been any early years setting. This particular setting was suitable as the school Head Teacher and Centre Head were willing to offer their pupils, staff and premises for the undertaking of the research. Purposive sampling was used as a non-probability sampling strategy focussing on three-to-five-year-old children ($\overline{X}$ = 4 years and 4 months) in an area of Scotland, identified to be of social deprivation. In the early years setting, convenience sampling was the chosen strategy in consultation with the Centre Head, selecting children who were willing to participate and whose parents consented to their participation. It was not intended to select children with learning difficulties; however, one child was identified as possibly at risk of developmental delay and one child had a speech impediment (stammer). Participants were to be even numbered in terms of gender. Ultimately, there were five boys and four girls.

The children were aged 4 years (mode) and were attendees at the early years centre. It is possible that of that all of these children may have been identified as ‘at-risk’ as the area is an ‘at-risk’ area. The children were not tested and were

regarded as a ‘normal’ selection for the area. This age group was chosen as it is one which is pre formal literacy instruction so that children had not yet been formally introduced to literacy instruction. It is also a time when the brain has high plasticity and is sensitive to experience. Seven children were aged four years, one was rising four and one was aged five, but it was decided that it would be better for him to begin formal schooling at age five and a half years. The other children were due to begin formal schooling from age four and a half years, the forthcoming September.

3.8 Accommodation

A space in the hallway was regarded as a suitable one for the intervention. As it was a hallway, it was a thoroughfare between rooms. It was testament to the children and maybe the intervention that the children were generally not distracted by people and other children passing through on occasion. This choice also added to the naturalistic nature of the intervention, with out of classroom activities often having to take place in spare spaces, often not designed for activities. The space allocated had a sofa with cushions to each side and doors to other rooms. The space was big enough to accommodate the children sitting in a circle and moving around the room.

3.9 Ethics

In accordance with the SERA guidelines (SERA, 2005), all participants were informed that they were free to withdraw from the study at any time. Children were asked by their class teacher prior to each session if they wanted to attend and were

free to not attend if they did not want to. The children chose to attend on each occasion.

In adherence to the ethic of ‘minimal intrusion’ the intervention was conducted in the children’s usual setting, with their usual staff members, plus the researcher. The use of school children to be videographers further complied with this ethic, ensuring that children would have no undue anxiety caused by unfamiliar presences.

Nothing detrimental was predicted or observed for the children pertaining to the intervention. There were no incentives offered for participation; the intervention was introduced as a normal part of the day. The props and anything used within the sessions was checked for adherence to health and safety regulations.

The researcher complied with all policies of the early years setting, kept to agreed times and used Christian names and surnames as per the policy. Teachers and pupils were addressed by their first names.

Parental consent was obtained from all parents in writing and children’s consent was obtained verbally by the teacher and Centre Head. Consent of the Centre Head, the adjoining school Head Teacher and participating helpers was verbal. Older children who operated the camera were volunteers, selected by the Head Teacher of the school.

All data collected remained in the possession of the researcher and confidentiality was observed. The intervention was appropriate to the age and safety of children. There were no health issues of which the researcher needed to be aware. At least one member of the school staff was with the children at all times. The researcher held a PVG certificate and was a qualified teacher.

The researcher was aware of the observance of respect for the children's culture, use of language, accepted behaviour, beliefs and values and took lead from the centre staff in case of doubt. The researcher was respectful of the centre and staff and the daily routines and took care not to cause any disruption. The children were free to leave at any time and knew to ask the teacher (the centre teacher or assistant) if they needed to leave the room.

The researcher took care not to ask leading questions which could be suggestive of answers and aimed to accurately reflect the voice of participants. The researcher observed sensitivity towards the feelings of everyone involved in the research.

From consultation of the guidelines of Shaw, et al., (2011) on conducting research with young children, the following recommendations were followed:

- Use small groups
- Use of appropriate language that children will understand
- No right or wrong answers – just views
- Ensure children understand the nature of the research

- Sessions not longer than 90 minutes – (recommendations for quantitative data)
- Use of ice breakers - (recommendations for quantitative data)
- Not too wide age range so the activities can be appropriate to age
- Retain child's 'voice'

3.10 Methods and Procedure of Data Collection

3.10.1. Pre-intervention

Children were aware of the sessions and were briefed beforehand. All participating staff were able to support the children. The intervention was designed, timings were agreed and the space for the intervention was allocated and adhered to health and safety policy. The intervention began at the agreed date and time.

3.10.2 The Intervention

The intervention was based upon best practice from the literature review and upon specific literacy aims. Consistent with evidence from the literature review, the intervention was cumulative in terms of skill building and built upon prior knowledge. The activities were set in a child-centred context, with themes that were engaging for children of four years of age, for example, songs and rhymes about animals, transport and daily life. The activities involved movement and incorporated the use of props and instruments, commensurate with the age group of the participants. The

expectations of engagement and performance were in alignment with the expectations of this age group. The activities were chosen from a repertoire of children's songs and rhymes familiar to the researcher and which she determined that she would be able to deliver in such a way as to promote literacy outcomes. The program set was flexible in that activities could be removed or added in response to participant needs and preferences.

The intervention aimed to supply data which would answer three main questions proposed from the literature review:

- To what extent could a literacy-through-music program promote the foundational literacy skills as identified in the literature review over a six-week period?
- Which activities are most effective at promoting literacy outcomes?
- Can any underlying mechanisms be identified to which the attainment of literacy outcomes could be attributed?

plus additional questions:

- Was there any evidence of improvement in sound awareness?
- Were there any other observable outcomes other than the focus skills and literacy competencies?
- How did the presentation of the program differ from a music program?
- Did the presenter exhibit any particularly good or poor practices?
- Were there any negative outcomes of the program?
- How did children respond to the program?

- Would it be possible to identify children at potential risk of literacy failure through the program?
- Could the program be considered worthwhile?

The activities were sequenced to provide a variety of activity types and to enable children to move physical positions throughout the session. The same structure was maintained each session as follows:

- Introduction – welcome and hello songs in a sitting position
- A range of activities – sitting, with puppets, standing, moving around, use of parachute, props and instruments. All activities were designed to promote a range of foundational literacy skills.
- Finale – goodbye songs in a sitting position

Activities varied as children became accustomed to the structure to ensure that interest was maintained by the introduction of some familiar and some novel experiences. Each activity was used to promote pre-literacy skills as identified in the Sample Activity Program (Appendix 2). Most of the activities promoted many skills; for example, all activities promoted listening skills, comprehension and language production. Some explicitly targeted the ability to tap to a beat, rhythm or identify syllables for example, whilst others required co-ordination, balance and spatial awareness.

Listening skills and language production were promoted with comprehension and prosodic awareness being highlighted. The five areas of cognition identified as

indicators of literacy proficiency were also promoted through the activities. Activities were chosen which were motivational and of interest to the age group. Movement was included to reinforce language and phonological awareness through action songs and rhymes. Matching the syllables in the lyrics to the notes in the music was a deliberate strategy to further reinforce awareness of syllables. and to promote awareness of rhythm by moving, clapping, stamping or playing instruments along to syllabic music. Attention was drawn to vocabulary and rhyme by the use of cloze, where children were invited to supply a missing word which rhymed with an earlier one.

Alliterative rhymes were included to help to raise awareness of phonemes in words and also any opportunities taken by the presenter to draw attention to individual sounds in words. Picture books were also used to promote bibliographic awareness and to help engagement with books and text.

As language and PA are identified as the most important determinants of literacy success and phonemic awareness the most important of PA, these were focal to the study, but the researcher hypothesised that ALL of the skills brought together may have the greatest influence upon early literacy skill acquisition.

3.10.2.1 Design of the Intervention

The intervention consisted of twenty-four, thirty-minute daily sessions designed with regard to findings of the literature review – progressive skill building and literacy

experiences – looking at text, stories, rhymes, letters – listening to sounds – music, words, oral segmenting of words, use of instruments and voice to make sounds and pictures to be ‘read’ and responded to.

Sample sessions were planned, (See Appendix 2) but adjusted at the time of delivery to suit children’s preferences and responses, timing changes and appropriateness at the time as any early years session would be. A ‘big book’ of hand-clapping rhymes was located in the centre, so that was utilised too.

The planned intervention incorporated effective strategies and advice from previous interventions for example, from Fisher, (2001) – music complements the instruction but should be tied to the instruction; hence the songs, ‘There Are So Many Fishes,’ ‘Going Fishing in the Sea’ and ‘One, Two, Three, Four, Five, were included as they were tied to the concept of counting. The instruction also included ‘fish’ to count. Moyeda et al., (2006) suggested that integrated auditory, visual and motor skill activities and specifically those which help children to discriminate sounds and form auditory-visual associations are most valuable; hence the two activities ‘Farm’ and ‘Puddle’ were included. Register et al., (2007) found that children made significant gains in reading comprehension and that attention was heightened when musical activities where integrated with storytelling. The rhyming story book set to music, ‘My Cat Ben’ was included in the program for this reason. Bolduc, (2009) suggested that adding activities which specifically match sounds to symbols will help children with this skill and also print direction. A musical alphabet book was included for this purpose. Frasher, (2014) suggested the use of finger plays, singing, singing games,

poems and stories that include rhyme, rhythm and alliteration. There was a plentiful supply of such activities in the programs, with fifty activities available for inclusion. The BDA also specified ‘confusion of directional words’ as indicative of language problems, so this was included in activities (up/down; left/right).

The intervention was delivered with exactly the same structure every time (concurrent with Bruner’s theory) of the provision of a spiral curriculum, this enabled the children to become comfortable and familiar with the activities. Repetition of activities was necessary initially until children learnt what to do. The content then increased gradually to incorporate more activities; repetition was deliberately employed to promote memory retention and help children to anticipate the forthcoming activities and create a relaxed and enjoyable environment which was conducive to learning.

Each session involved a range of activities. Children were seated on the floor in a circle and all activities involved some movement.

3.10.2.2 Materials

Activity program (See Appendix 2).

3.10.2.2.1. Props

Various props were utilised to add interest and to support learning:

- Humpty Dumpty puppet for initial interaction and focus. One child each session was allocated to ‘take care’ of him for the session.
- parachute to represent ‘sea’ for songs relating to water.
- coloured plastic fish (designed – regulations – too big to swallow and non-toxic)
- turtle picture to accompany turtle song
- owl picture with opening and closing eyes for storytelling
- a range of percussion instruments in differing materials – wood, plastic, metal – supported learning about different materials and the sounds they made, also for use with a range of songs to be aware of timbre, duration and tempo
- a set of numbers to display on the wall for number recognition, counting, sequencing and to accompany songs
- a clock for number recognition and use with a song
- the ‘My Cat Ben’ songbook, supported vocabulary and sequencing
- a literacy resource picture-book to support the ‘Puddle’ and ‘Farm’ songs – children responded to visual cues.
- a musical alphabet book
- a hand-clapping songs book
- claves for rhythm activities
- coloured wooden bricks for building, following pattern and instruction and rhythm and beat activities
- felt, finger mice for use with the rhymes about mice

3.10.2.2.2 Music

Music was pre-recorded by a musician on piano to accompany the songs. The music was syllabic as opposed to melismatic to reinforce children's ability to syllabify, as the notes in the music were matched to syllables in the song lyrics. Each piece of music had an introduction to encourage children's listening and timing skills, and to help children to be prepared for the activity. Verses were repeated where required, and an ending to the music was added to illustrate the concept of beginning, middle and end and to allow mental time to wind down from an activity, indicating its end.

3.10.2.2.3. Music Player

The music was stored on and played from a phone which was connected to a large speaker, suitable for use in a large space.

3.10.2.2.4 Video Equipment

The videos were recorded on an iPad, by the primary school children. The equipment used and the child videographers were non-invasive and enabled the recording of the sessions to be low key. Limitations of this were that not all participants were included in every recording of every activity, not all of every session was videoed and that the recording was dependent upon the particular skill of each child recorder at the time, as they were different for each session to ensure

that they were not missing more than one lesson. However, the benefits of creating the most natural recording method outweighed the limitations and data was collected at every session. An alternative choice of recording would have been to have professional videographers, but these would have been adults which could have been intimidating for the children, resulting in a less natural environment, have involved police checks and additional expense.

3.10.3 Intervention Delivery

The focus on the first week was upon ensuring that the children felt at ease, confidence building, encouraging participation and settling the children in to the format and content of the sessions. The researcher was aware that her accent was different to that of the children and that the children may need time to adjust to it and her to theirs.

As children became increasingly familiar with the content, the activities changed to promote an increasing number of skills. This happened in response to the children's behaviour and not necessarily as per the programs planned. For example, if the children requested an activity, then it was generally delivered or if they wanted to repeat an activity then this request was granted as time allowed. The aim was to emulate as natural a classroom situation as possible and response to children's requests and incorporating their views and desires was part of this.

The delivery method was part of the intervention design in that it was not only a set of songs, rhymes and stories to be delivered and engaged in with the children. There was an explicit and deliberate desire on the part of the researcher/teacher to promote early literacy skills through the activities offered. This is in contrast with the delivery of musical activities by a music teacher who will generally have musical outcomes as the objective. As a literacy specialist, the researcher naturally promoted these outcomes. Part of the research was also to observe and attempt to identify this difference in purpose and method in terms of teacher delivery. The researcher also sought to deliver best practice in terms of teaching, using cloze to encourage verbalisation, being demonstrative to encourage and model required actions, offering praise when due, to support emotional wellbeing and feelings of success, using repetition to embed memory, allowing children to make choices on activities, listening when children spoke and responding positively to their contributions, scaffolding where necessary and ensuring that all children were included. As Fröebel advised kindergarten teachers in 1895 (Fröebel,1895a) to take care of the child as the mother would do, which is now enshrined in the term ‘in loco parentis’. He further advised that the child is not only passed ‘hand-to-hand’ but ‘heart-to-heart’. For the researcher this infers, have patience, allow each child to develop as to themselves and offer equal and ample opportunity for learning and growth.

The researcher/presenter had no desire to coerce any child into doing any of the activities. If children chose to not participate, this was acceptable. Children could leave the room at any time or ‘sit out’. It was acknowledged by the researcher that

even when children do not look to be listening or participating, they are often still listening to or processing events from the session or previous sessions or anything else of their choosing.

3.11 Method and Procedure of Data Analysis

The data was collected in video format. Due to the amount of data collected (over twelve hours of video) it was decided to take a sample of sessions. The question arose as to how much data would offer sufficient information. The first two sessions were chosen, as at this point it is possible to assess the skills at the beginning of the intervention. Sessions seven and nine were chosen as they had the greatest amount of data (time recorded) and children attending. The end session, number 24 was excluded as there were fewer children attending and a small amount of data recorded. Session 23 was excluded as the activities did not align with those in sessions 1, 2 7 and 9. Session 22 was chosen as the final session to assess whether the skills identified as important to literacy had been promoted. Initially it was considered that this might be enough. However, in order to offer greater depth and a more even picture of progress over time, session 16 was also added as it had a high number of activities recorded and eight out of nine children were present.

Each of the six videos was transcribed in respect of each child and their behaviour, actions and vocalisations for each activity in each session. This allowed for comparison over time for each participant, comparison between activities and comparison between each participant for each activity over time. The researcher

transcribed the videos for one child at a time. This allowed the focus to be on one child at any point in time and allowed for the recording of all the child's actions, responses, verbalisations, and non-actions to be noted. This necessitated the replaying of the video multiple times to check the responses and especially verbalisations, which were sometimes difficult to detect and decipher.

After transcribing each video for each participant and each activity, the text was divided into chunks of meaningful information which could be analysed further. Each piece of information was given a code to indicate its reference to child, session and activity. Each chunk of information was also colour coded with red, amber or green to indicate whether the content in the chunk of information indicated that something was not happening (red), happening to some degree (yellow) or being actioned very well (green). The data was then tabulated to see if there were any discernible, emerging patterns via the colour coding as a general overview. This information could be regarded as subjective, although it aimed to be objective, but was garnered to offer an overall picture.

Lankshear and Knoble (2004:180) advise that '*the data must be relevant to one's research questions*.' At this point it was possible to code the data further into themes. The researcher looked to the research questions to decide what was relevant. Deductive coding using a priori codes was initially used as the codes were determined by the literacy indicators identified from the literature review and included in the model in Figure 1.

- Cognitive skills – comprehension, attention and focus, sequencing and prediction, RAN and memory
- Language – listening, language comprehension, language production, prosody
- Phonological Awareness – awareness of syllables, rhymes and phonemes

This method of coding offered a tightly focussed lens through which to view the data. It became apparent, however, when 'chunking' the information, that other codes may arise as there could be other data which was relevant and may help to elucidate underlying mechanisms which may explain the learning taking place. The coding subsequently became hybrid coding as other codes were added as some new ideas for themes emerged.

For each video, transcription, coding and analysis was undertaken of the behaviour of each child in response to each activity and verbal utterances, plus changes noted in literacy behaviours over time.

Additional codes included, 'evidence of pleasure,' 'particular notable teacher actions' ones which may differ from a more traditional music or literacy session, or may be regarded as particularly good or poor practice, and 'other child behaviours' which may or may not contribute to learning or indicate other issues, such as yawning or finger sucking. Further coding was conducted to elicit information on the value of each activity to literacy skill promotion in terms of frequency of citation as promoting skills and enjoyment of the activities.

3.12 Limitations

Although the Centre Head had initially agreed to an initial and final assessment, she did not wish this to go ahead so, in accordance with SERA ethical guidelines, her wishes were respected.

As the research was naturalistic, many factors were beyond the control of the researcher in terms of data collection. The quality of the recording was reliant upon the expertise of the child videographers. Some footage was too poor to be used so was discarded, for example it may have had no sound, moved around too quickly or was directed in the wrong direction. If there was no reasonable data to be gained from the footage, the video was deleted. Most recorded sessions were incomplete as the recorders arrived late, left early or stopped recording by accident or for another reason.

Not all children attended every session; if a child was absent on a particular day or school was closed or there was another school event happening, then no recording took place. Twenty-four days were recorded.

CHAPTER FOUR – DATA COLLECTION AND ANALYSIS

4.1 Introduction

Twenty-four sessions of integrated music and literacy sessions were delivered over six weeks. Nine children were assigned to attend the sessions which took place each morning. The sessions were held over January and February. The participants were all due to begin mainstream full-time schooling in the August of the same year. Children in Scotland may begin at four and a half or five and a half years of age; parents are given the choice when to send them. There were five boys and four girls. Six of the nine participants were four years old. Two boys were three years old but would be four and a half before the August. One boy was five years old and would be just over five and a half years old upon school entry in August. He had not started school this academic year as it was suspected that he may have developmental delay and he was described as ‘generally not keen to participate in activities’ by the Centre Head. The Centre Head had asked if he could join the group as it might be a good experience for him and suggested that he might enjoy it. It was agreed that he could be part of the group. Another boy had a speech impediment, a stammer.

The sessions were planned but were flexible in their length and content depending upon needs of the participants. The presenter (P) was cognisant of the fact that she was a visitor and ensured that she would in no way impact negatively any other learning or school activities. Hence, the original thirty planned sessions were only

twenty-four as there were long weekends, and an occasional activity which took priority over the sessions. Sessions were planned to be thirty to forty minutes in duration. Flexibility was built in to reduce time if the children were looking tired or disinterested or to extend the time if they were engaging more or if they requested more or repeat activities. There were fifty activities which were delivered. The activities are identified below with each allocated an activity number for reference:

Activities on Videos

A1 Welcome Song
A2 Time to Sing Hello
A3 Hello Names
A4 Up and Down
A5 Open Shut Them
A6 If You See a Puddle
A7 Can You Walk on Tiptoe
A8 Calm, Rough, Stormy Sea
A9 Going Fishing in the Sea
A10 One, Two, Three, Four, Five
A11 There Are So Many Fish
A12 Left Hand, Right Hand
A13 Five Fat Peas
A14 Alley O
A15 Bus Song
A16 Marching to the Drum – Not transcribed
A17 Five Fat Sausages
A18 Build a Brick
A19 Tap and Tap Together
A20 Tap Your Bricks
A21 Tap Your Sticks in the Air
A22 As I Was Walking Down the Street
A23 Cobbler Cobbler
A24 Tap Quiet, Loud, Fast, Slow
A25 I Went to Visit a Farm
A26 Aeroplanes
A27 Syllables
A28 Turtle
A29 I'm a Little Humpty
A30 Hickory Dickory Dock
A31 Happy and You Know It – Not transcribed

A32 Humpty Dumpty - Not transcribed
A33 Hurry Hurry - Not transcribed
A34 Okey Cokey
A35 My Cat Ben
A36 Phonemic Awareness – Not transcribed
A37 I Hear Thunder
A38 Twinkle Twinkle
A39 I am Humpty Dumpty
A40 My Hat - Not transcribed
A41 Granny's House - Not transcribed
A42 Mousey Brown
A43 Round and Round the Garden
A44 Mouse in a Hole
A45 Mouse Mouse in Your House
A46 Rover
A47 Owl Story - Not transcribed
A48 Goodbye Names
A49 Goodbye All
A50 Instruments

Of the fifty activities presented throughout the program, eight activities were not in the six videos transcribed. There are forty-two activities included in the transcriptions. Depending on the length of each activity, an average of ten to fifteen activities were presented each session. At the beginning, activities were repeated to familiarise children with them, then more activities were added and replaced the initial ones. This aimed to help to maintain interest and allow more skills to be promoted. If any activities seemed to be of little value, they were discontinued. A4 was such an activity; the participants knew the directional adjectives 'up and down', 'out and in' and 'side to side' and the P decided that other activities were more useful. There was a small increase in complexity of tasks over time. For example, at the beginning, participants were asked to clap once in a given gap of silence (A5). This was demonstrated and practised without music first to give participants the best chance of success. Over time, participants were asked to tap an increasing number of taps with claves (3 taps in A21) at a given point, to move their whole

bodies in time to a beat (A7, A16 and A46) and ultimately to keep a beat and a rhythm with percussion instruments and songs. In this way, the music was used to attune the participants to the timing of sound, both in music and language and to support participant learning to identify and tap out syllables (A27).

4.2 Data Collection Method

Videographers were sent from the school in an adjoining building each day to record the sessions. The videographers were children. To avoid the same children missing lessons, these were different each day. Two children came together for support and could take turns at recording.

In keeping with being low key and having very little impact upon the children being recorded, this worked extremely well. The negative impact was that the children were not professionals and some of the video was unfit for use, due to being unsteady and/or having so sound. These recordings were not used as part of the study. Fifty percent of the sessions were fully recorded, others only partially. This was not problematic as it would have been impossible to transcribe every video. In total, ten hours and twenty-seven minutes of video were available for analysis. A summary and snapshots of the videos taken, their timings and number of activities recorded each session can be found in Appendix 3. A record of attendance was taken daily and can be found in Appendix 4.

4.3 Data Analysis

The data collected allowed analysis of three areas, performance of the participants with regard to foundational literacy skill acquisition, which is recorded in the participant profiles in section 4.3.4.1; performance of the presenter which is identified in section 4.3.5 and effectiveness of the activities in offering opportunity for foundational literacy skill development, which is identified in section 4.3.6.

4.3.1 Step One – Transcription

Six sessions were chosen for transcription. This sample aimed to span from the beginning to the end. The first two sessions were transcribed, as they were introductory. Sessions seven and nine were chosen as newer activities were being introduced. Session sixteen was chosen as an interim session. The penultimate session was discarded as this day was chosen to present the children with books and only five children attended. The day prior to this, session twenty-two had the highest number of children and a long recording so this was chosen to be the final session for transcription.

The process of transcription involved observing one participant at a time. In order to be assured that the data was accurate the video was played many times for each participant, recording what was seen and heard from each participant, for later analysis. This process was objective and merely recorded what happened.

Figure 7.

Videos Transcribed

Videos Transcribed				
	Video Length	Number of Activities	Transcription Length	Number of Children Attending/9
Session 1	17m 52 secs	11	3,900 words	8
Session 2	16m 09 secs	10	4,542 words	7
Session 7	35m 28 secs	16	13,045 words	6
Session 9	18m 28 secs	14	12, 564 words	7
Session 16	42m 08 secs	21	14, 559 words	8
Session 22	33m 09 secs	14	7, 933 words	6
TOTALS	2 hrs 43 m 14 secs		56, 545 words	

4.3.2 Step Two – Segmenting the Data

The transcriptions for each participant, session and activity were segmented into separate meaningful chunks of information and each chunk was allocated a code to indicate its relevant, participant, session and activity. This allowed phrases, sentences and paragraphs to be further analysed to find if any of the information might relate to literacy skill acquisition.

Each chunk of data was further colour coded to indicate if it showed that the content indicated that a skill or action was demonstrated effectively (green), with an element of unsurety or partially demonstrated (yellow) or red if the skill or action was shown to be definitely absent. There was no coding for something not happening as this can neither prove nor disprove existence. It is acknowledged that this colour coding had an element of subjectivity. It served to help the researcher to later locate evidence of areas of competence and those where participants struggled and to indicate changing competences over time.

4.3.3 Step Three – Arrangement of Data to Show Performance Over Time of Each Participant

The data was transferred to Excel worksheets for each participant, according to activity number and session. Appendix 8 shows an example. This enabled the researcher to examine the performance of each participant in each activity over time. Due to the extent of information in each cell it was not possible to view all cells simultaneously. Appendix 8 shows three expanded cells.

If each activity had promoted only one skill at one level, then it would have been reasonable to hope that the colour coding would have indicated progression from red to green over time. However, although there was generally more green to be seen towards the end of the program, most cells gave mixed information of what participants were able and not able to do and the levels of skill became gradually more complex as the program continued. For example, initially participants were asked to clap one clap in a given space in a song (A5) as well as copying the actions of the presenter. The presenter gave verbal (intake of breath before ‘clap’) and physical (wide eyes and wide arms ready to clap) cues to scaffold when participants were to clap and alert them to a change in the music/lyrics. This promoted participants’ ability to perform an action at a given time. In a later activity, (A30) participants were asked to clap one, two, three and four claps in given spaces in a song. In other songs with claves, participants were encouraged to tap their claves to ‘one, two, three’ in a gap in the song, offering the same timing practise but with

manipulation of an object. Hence, the skills in each activity, even if the same, were not directly comparable due to increasing complexity in each situation over time.

This data recorded what happened in the sessions and what participants did or did not do. It gave an indication of engagement, further analysis provided evidence for foundational literacy skill development.

4.3.4 Step Four – Analysis of Performance of Foundational Literacy Skills

In order to address the first question arising from the literature review – 'To what extent could a literacy-through-music program promote the foundational literacy skills as identified in the literature review over a six-week period?' – in this case over

twenty-four sessions, a table was constructed for each participant, where evidence for the skills which contribute to competence in foundational literacy skills could be laid for comparison.

The data was analysed to find evidence or otherwise of proficiency in the foundational literacy skill areas identified in the literature review, which could be determined for each participant over the twenty-four sessions. Evidence was identified according to the following criteria:

1 RAN - Participants were not asked to name random items. The nearest evidence for this skill was the reciting of numbers in sequence. This is evidenced under ‘Sequence’ and ‘Knowledge – Number’.

2 Memory – this was evidenced by the verbal recollection of facts, song lyrics, melodies and actions.

3 Comprehension – in this case, comprehension does not specifically relate to language but to the understanding of what to do, what is happening or of cause and effect. It was evidenced by occurrences where a participant made a unilateral decision, performed an unsolicited action for a purpose or worked something out themselves.

4 Sequencing and Prediction/Anticipation – evidence was provided for this skill through early performance of an action, before the P had initiated the performance or verbal acknowledgement of a forthcoming activity, action or verbalisation and ability to demonstrate a sequence (numerical, such as counting, knowledge of what comes next or a sequence of actions).

The ability to sequence and anticipate what comes next in a sequence is related to memory, (the ability to memorise order) mental and physical (which can be muscle memory).

5 Attention and Focus – It is not always easy to discern whether or not a person is paying attention to what is going on around them. It is possible for a person to look as though they are not paying attention, for example, facing away from a speaker, being physically removed from what is directly happening, or vocalising themselves, or making a noise at the same time as the speaker. These actions may however mask attention that is being paid. It is equally possible that these actions may be indicative of the person being preoccupied with something else and they are not paying attention. Equally possible is that a person is looking at a speaker and appearing to be listening and focussed but mentally their thoughts are elsewhere. Physical or verbal responses to a speaker's questions or requests are a more accurate indication of attention and focus. Eye contact and facial and body gestures may also indicate attention being paid. Such responses were cited as evidence of attention and focus.

6 Language

6a Listening

Listening and hearing are separate features of language. Whilst the ability to hear clearly affects language perception, processing and comprehension and also the ability to reproduce language accurately, the ability to actively listen to sound is more related to focus and the ability to pay attention. As there were no previous indications that any child was unable to hear clearly, hearing is not detailed here and listening is detailed under 'attention and focus'.

6b Language Comprehension – Listening to and Following Instructions

When a child follows given instructions accurately, they are demonstrating that they have listened and understand the instructions given and the language in which they are delivered. It is possible also that a gestural acknowledgement, such as a nod of the head or verbal affirmation may indicate comprehension, although this may or may not be the case as anyone can ‘say ‘yes’ if they think it is what the person delivering the question wants to hear. Effective demonstration of a task is a stronger indicator of comprehension. In the case of the activities presented, the verbal instructions were often accompanied by actions or gestures and it was sometimes difficult to be clear whether a participant responded to a visual cue or auditory instruction. When participants followed visual cues but not auditory instructions this was noted and vice versa.

6c Language Production

The ability to communicate clearly through verbal production is highly correlated with the ability to read and write and more strongly with writing as this is also a productive skill. Evidence of language production is recorded. A four-year old child would be expected to structure and deliver a simple sentence and be beginning to produce complex sentences. When participants verbalised, their verbalisations, where possible (some were unintelligible) were recorded.

Where a participant communicated through body language or gesture and did not vocalise, this was also recorded. (For example, Participant M ‘me’, patting chest). Body language and gesture are forms of language which support spoken language. Participants used both to express themselves. It was not expected that the participants might express themselves through actions without speech, other than nodding in affirmation, but this was the case.

6d Prosody

Incidences of such awareness or use of prosody were noted.

7 Phonological Awareness

7a Syllabification

The ability to chunk words into syllables was easily evidenced by offering opportunities for participants to choose a word to syllabify and encouraging them to tap out the syllables. This evidence was recorded.

7b Rhyming

An awareness of rhyming sounds is most accurately evidenced by direct questioning of which sounds match and generation of a matching rhyming word. As the activities were intended as enjoyable learning opportunities and not as formal

assessment, there was no direct questioning. Participants offered rhyming words at the end of rhyme and song lines when the presenter used cloze. This could have been evidence of memory and not necessarily rhyming skill, although drawing attention to rhyming words helps children to become aware of them. Where the presenter was able to pose rhyming questions, responses were noted, also instances where participants used rhyme which was unsolicited.

7c Phonemic Awareness

Activities to promote and assess phonemic awareness were included towards the end of the program. It was hoped that promoting awareness of music and language sounds would contribute to a child's ability to segment at least initial phonemes. Any evidence of this was via direct questioning as part of an activity and thus was clear to determine, but was not evidenced in the chosen videos.

8 Motor Skills

Motor skills were evidenced via activities which involved movement and balance (gross motor), construction of bricks, manipulation of claves and percussion instruments (fine motor) and also in activities which included the crossing of the midline. The incidence of the copying of presenter actions was also noted.

9 Motivation

As enjoyment is an element of motivation for learning; smiling, laughing and eagerness to participate were noted as motivational factors. It is also understood that smiling and laughing may also be nervous reactions, the researcher tried to ascertain the root cause of the actions and noted them. Also noted were instances where a participant may have appeared unsure or seeking reassurance, as well as ones where participants appeared confident.

10 Ability to Keep Time

Evidence was recorded of:

- the ability to keep a beat to music
- the ability to keep a rhythm to music and language (allied to syllabification)
- unsolicited movement in time to music – this could be due to previous training but is more likely to be due to innate awareness of rhythm.
- timing of speech or action – evidence was noted when a participant contributed a movement (clap, stamp, jump) at the correct time or interposed a word at the correct time.
- co-ordination – co-ordination is required where both sides of the body work together to produce an action; this was evidenced through activities where participants used bricks, claves and instruments and action songs and rhymes.

- mental processing speed – the researcher noticed that it took some participants longer than others to keep up with the timing of the activities. For example, some participants would begin in time but then lose the timing or it would take them time, to get in time. This was also evaluated through speed of response to requests.

As the video footage was transcribed, it became clear that other factors may impact early literacy learning. These are:

- Volitional rehearsal – some participants were seen to be performing activities which were not the ones currently being actioned. Evidence was recorded of these occurrences.
- Finger or hand sucking – this was not an initial factor in literacy learning but the incidence of this activity may be one which impacts upon learning and may need further investigation.
- Engagement with the activities – engagement or non-engagement was recorded.
- Conceptual knowledge – colour, number recognition, left and right. Evidence of knowledge was recorded.

Comfort or discomfort with the environment was recorded if observed. As the environment was familiar to the participants it was not envisaged that this would be a problem. The staff were also familiar to the participants. The presenter was an unfamiliar face but strove to ensure that the participants were not under any

pressure and that the activities were enjoyable, and participants were free to leave at any point should they wish to do so. Participant confidence was also noted as this impacted or was as a result of performance ability. Consistent with negative case analysis, the researcher noted instances which would disconfirm any improvement in early skill development. Additionally, the actions of the presenter were noted, and recorded were any which would possibly differ in only music or only literacy program presentation; this aimed to highlight how presentation of an integrated program may differ.

4.3.4.1 Participant Profiles

The further analysis of the data supplied for each participant allowed an early literacy profile to be built for each one. This analysis provided not only a criterion-referenced assessment at one point in time (the literacy skills and knowledge) but allowed for normative assessment (comparison against early years benchmarks) and ipsative assessment, tracking individual progress over time.

The data collected was analysed by participant and activity over time. Each piece of data was coded pertaining to participant, session and activity code, a random letter or letters for the name; ‘S’ and a number to identify the session; and ‘A’ and a number to identify the activity. The tables below reflect proficiency in skill acquisition which was evidenced in each particular session for each participant. A sample of evidence, for reference, is added in each case as one example only. The evidence is located in the Activity to Session documents for each participant (example in

Appendix 8) and also in the transcription (example in Appendix 7). The colour coding reflects:

Green – evidence of competence
Yellow – evidence of competence on some occasions but sometimes unsure, may waver
Red – evidence that participant is not competent
Blue – indication that the participant was absent
Blank – no evidence for or against
The letter H at the top of a session signifies that the participant had the Humpty puppet to hold for that session. Participants took turns to hold the puppet.

Figure 8.

Participant E Literacy Profile

Early Literacy Skill Development Knowledge and Skills and Contributory Factors to Literacy Learning						
Sessions	1	2 ABS	7	9	16	22
Skills						
RAN/Counting fluency						
Memory	E S1 A10		E S7 A5	E S9 A23	E S16 A1	E S22 A1
Comprehension	E S1 A8		E S7 A26		E S16 A19	
Sequencing and Prediction	E S1 A3		E S7 A28		E S16 A5	E S22 A46
Attention and Focus	E S1 A2		E S7 A21	E S9 A21		
Language Comprehension – Listening and following instructions	E S1 A4		E S7 A5	E S9 A17	E S16 A20	E S22 A14
Language Production	E S1 A4		E S7 A16		E S16 A20	E S22 A35
Prosody	E S1 A9					
Syllables			E S7 A27	E S9 A27	E S16 A27	E S16 A27
Rhymes	E S1 A9				E S16 A45	E S22 A44
Phonemes						
Keep Time – sing or rhyme in time			E S7 A5	E S9 A19	E S16 A48	E 22 A3
Tap a Beat			E S7 A20		E S16 A23	E S22 A35
Tap a Rhythm			E S7 A20			E S22 A35
Body Moving in Time to Music	E S1 A4			E S9 A3		
Clap or Move at the Right Time	E S1 A5		E S7 A19	E S9 A17		E S22 A46
Processing Speed				E S9 A21		
Volitional Rehearsal	E S1 A11		E S7 A21		E S22 A22	E S22 A26
Pleasure/Smiling/ Motivation	E S1 A4		E S7 A15	E S9 A3	E S16 A15	E S22 A44
Motor Skills – Copying Action	E S1 A5		E S7 A7	E S9 A19	E S16 A23	
Co-ordination				E S9 A21		
Balance	E S1 A7		E S7 A7	E S9 A34	E S16 A7	
Engagement	E S1 A6		E S7 A28	E S9 A34	E S16 A21	E S22 A35

Left and Right			E S7 A12	E S9 A12	E S16 A12	
Colours	E S1 A11					
Numbers	E S1 A10					
Crossing the Midline			E S7 A1	E S9 A21		
Finger/Hand Sucking					E S16 A3	
Confident/Comfortable	E S1 A2		E S7 A1			

The data collected on participant E provided evidence that she possessed a rich assortment of knowledge and skills at session one. Her cognitive, language and timing abilities were evident. Despite missing ten sessions from the twenty-four, she was able to participate fully in each session.

Cognition

She paid attention to the P and was ready for the beginning of most activities throughout the sessions. For example, in S16 A21 she sat looking at the P with a clave held up in each hand, ready for the activity and had predicted that this was the appropriate action to take for what was to follow. In S7 A12 she seemed to be looking into space and didn't put out her left hand when asked, however she then put out her left leg and sang 'left leg out' so she was singing the song to herself ahead of time.

She was able to follow and reproduce a sequence, evidenced by her performance of counting beyond ten, (S1 A10; S1 A11) and over the sessions to reproduce song and rhyme lyrics and musical melodies in entirety, for example in S22 she sang all of A28, requiring memory and sequence. She also remembered that the octachime had eight pieces when asked in session 16. She was able to understand the consequences of actions and reason outcomes. When asked to move outwards

with the parachute in session one, participant E was able to recognise the point at which the parachute was fully stretched and audibly said, '*No more'* to stop other participants from pulling it further. This implied that she was aware of the negative consequences of doing so and able to communicate this to others and impact on their behaviour (S1 A8). She was able to recall previously learned songs and reproduce them in a different environment (S1 A10). As well as reproducing musical and language patterns she was also able to follow visual patterns as evidenced in A18 throughout the sessions where she followed a given pattern to construct various shapes with bricks.

Although RAN was not assessed as there were no naming tasks, the fluent recitation of numbers would seem to be a similar task. Koponen et al, (2013) found that counting ability was a strong predictor of reading fluency. This suggested that E's ability to count fluently could be predictive of reading fluency.

Language

In S1 A11 the P asked, '*Can you see a blue fish?*' She responded, '*I got one'*. The P asked if the participants could see a yellow fish. She responded, '*I've got two yellows*.' [She was asked to and did give one away] Later the P asked, 'How many yellow fish have we got?' She replied, '*one*', referring to herself. When the P sang the song, she interposed '*yellow*' at the right place and time when the P used cloze. When the P was counting the green fish she said, '*More green over here'*. She interposed '*orange*' at the correct place and time when the P used cloze. At the end

she said, '*There's orange here'*. She was able to understand the language used in the session and respond appropriately.

She was able to pose and answer questions and frequently answered questions asked, especially interposing ending words when the P used cloze. She was able to express her opinion '*I can't put my arms out'* (S7 A26) for example, when she laid on the floor to be an aeroplane and didn't have enough space. She was aware of and used prosody. In S1 A9 The P said, '*We are going fishing.*' She repeated in a quizzical tone, '*Fishing?*'

In S1 A6 the P used cloze 'If you see a puddle you have to go …?' She responded '*jump*', the P said, '*splash*'. When the song played, she jumped on 'splash' but did not verbalise 'splash'. It is possible that the difference between the action and the word in her head and the onomatopoeic word being used, prevented her from verbalising. Subsequently, in S16 she vocalised 'splash' and jumped at the same time. She also sang some of the words of the song.

In S16 she was asked to name the guiro. She identified it as a scraper. The P told her there was another name. Another participant had a guess, but it was not easy to discern what they had said. This maybe gave E a clue and she said, '*guiro*'. In S16 she repeated the word 'introduction' when asked but was not able to remember it when asked in session 22. She was however absent for sessions, 17, 19 and 20. In S22 A26 the P asked the name of the shape that the participants would sit in. She responded '*semi-circle'.* The P had been describing this shape each session.

The TA reinforced this learning and moved her hand above the shape of E's body as she laid on the floor and told her that she was also in the shape of a semi-circle.

Phonological Awareness

Participant E was able to syllabify words and offered 'SuperGirl' as her example when asked in S7 and 'Bat Girl' in S9, also tapping the syllables correctly to 'alligator'. She vocalised the syllables and tapped the drum with a beater at the same time. In S22 she was able to generate novel words from her head, (lion, cheetah, tiger and elephant) when asked, as examples of words with three, four and five syllables. Initially she suggested 'tiger' and 'alligator' when asked for a word with three syllables. The P mimed 'elephant' and she said 'elephant'. The P asked her how many syllables were in elephant and she said 'three'. This was not conclusive evidence of being able to internalise and count the number of syllables in a word, but she could definitely syllabify and tap out the syllables of words.

Whilst participant E often generated missing rhyming words, but this may not have been due to her ability to rhyme but to memory of the rhyming words in rhymes and songs she had learnt. However, in S22 A44, when prompted to say the word 'cheese' she responded, '*cheesy wheezy,'* demonstrating her ability to play with rhyming words and initial sounds, unprompted. When asked what rhymed with 'belly' in S22 A35, she responded 'jelly' indicating that she understood the concept of rhyme and was able to offer a rhyming word for one given.

Motor Skills

In S1 A5 she performed the actions competently. In S1 A6 she jumped when requested and with both feet together. She imitated a giraffe with her arm and stroked the picture of a puppy as prompted. In S1 A7 she held her arms out to the side to balance when taking 'big giant strides.' She was also able to balance to 'walk on tiptoe'. She was able to 'hold' an imaginary fishing rod in A10 and imaginary handlebars in A6. In S7 she made large, confident arm movements, waving in A1. Again, in A7 she balanced well by taking long, 'giant' strides.

She was physically adept and could balance and move well, adapting her gait and stature as per lyrics. She was able to follow instructions and to clap at a given time in the right place and on time. She performed actions and verbalisations on cue.

She was able to cross the midline to perform actions, for example, in S9 A21 where she crossed claves across her body to tap her shoulders and elbows.

Timing

Participant E appeared to have a natural sense of rhythm; in session one she could be clearly seen to be moving subconsciously in time to the beat of the music in A4.

She was able to verbalise and perform actions in the first session, when there was a cue to do so, for example, in A5 she was able to clap in the right place as instructed. In A8 the participants were prompted to say 'splash' and to 'splash' their hands into imaginary water. She shouted 'splash' and hit the floor on cue. In S16

A30 she was able to vocalise and add the actions at the right time simultaneously. In S7 A21 she was able to perform repeated actions in time (3) and at the right time.

In activities using bricks, claves and instruments participants were prompted to synchronise repeated and continued movements in time to melody and lyrics and to maintain a beat or rhythm throughout an activity. In S7 she was able to maintain the tapping of a beat with both her claves and knees in A19, whilst simultaneously singing several ending words. In A21 the rhythm was kept for the verse and the beat for the chorus by the P. This was confusing for her and so she alternated between beat and rhythm. In S9 she also alternated and in S16 she kept the beat.

In S16 A23 she was able to maintain the beat to the song whilst beating the triangle, which was swinging. This required both good co-ordination of left and right hands and the ability to perform an action in time to given music, which she was able to do.

Knowledge

Participant E demonstrated knowledge in several areas, she knew the colours of the fish presented (pink, yellow, blue, green, purple and red) and was able to choose and identify colours. She was able to count in sequence beyond ten. At the end of A11, the P asked, ‘What comes after 8’, she said, ‘9’. The P continued to count, ‘10’ then she said ’11, 12’. She also demonstrated that she understood the ‘oneness of one’ evidenced by her being able to count the fish she had (2).

The P asked participants to put out their left hands in S7 A12; she initially didn't respond but later did, correctly. In S7 she demonstrated knowledge of left and right, offering her left hand and leg as requested the second time. However, when she began to sing the song to herself, she put out the opposite hands as she sang. She wasn't co-ordinating her speech and movement. When the activity was repeated, and she didn't appear to be focussed she also confused left and right.

In S9 she initially put out her right instead of left hand, then realised and swapped. At the end of the song, she told the P, '*I've got mine in the left hand'*, which she had. In S16 she became confused when the music played as it was quite fast and did not put out her arms correctly. At the end when asked to put out her right arm, she did so correctly. If not hurried, she was able to discern left from right.

She also held up her right little finger for the song lyrics, 'this little finger on my right' (S1 A10).

Engagement

Participant E was highly motivated as evidenced by her keen participation and high level of engagement with the activities and her frequent answering of questions posed and interjections. Enjoyment of the activities, evidenced by frequent smiling, willingness to participate and help others, facilitated her engagement. For example, in session one, she responded enthusiastically when told the song (A4) would be repeated faster; she said, '*yes*' and smiled and nodded and in response to the

question to her by the T '*Did you like that?*' (A4), she responded, '*Yes, I did'* and was smiling. In S16 A7 she 'drove' the bus, which she clearly enjoyed as she 'drove' it for the duration of the activity. At the end she asked, '*Can we do it again'* and repeated, '*Again, again?*'

Participant E could be observed to be conducting volitional rehearsal on several occasions – she began doing actions to music, which accidentally played (A33) but she didn't sing it. She sang songs sometimes ahead of the activity starting.

In Session 1, A11 she continued to sing the song when the P had stopped and was speaking, she seemed to be conducting her own review of the song. In S7 she began to sing the previous song (still processing it) and doing the actions (A19 in A20). Just before A49 she began to sing the song to herself (self-practise and memory recall). When it did begin, she joined in and sang it again.

Conclusions/Other Observations

It is not possible to attribute the skill acquisition of participant E to the sessions as she possessed most of the skills at the beginning. However, the sessions offered her opportunity to practise her skills, to develop her vocabulary further, and gave her the opportunity to help others and in some areas, she was able to develop her skills further – consolidating left and right, memorising song melodies and lyrics, and practising synchronisation to a beat and a rhythm, which would further contribute to the establishment of literacy foundations.

Being more specific about the difference between beat and rhythm would have facilitated her performance at this task. It was noticeable that when she was not completely focussed then she was not able to begin on time, however her quick processing speed enabled her usually to catch up.

She appeared very confident and competent most of the time. She appeared comfortable throughout the sessions, there was no change from sessions one and two so none were recorded in the table. In S16 A3 she had fingers in her mouth and continued to sing with them there. There were no red flags for literacy learning.

Figure 9.

Participant C Literacy Profile

Early Literacy Skill Development Knowledge and Skills and Contributory Factors to Literacy Learning						
Sessions	1	2	7 H	9	16	22
Skills						
RAN						
Memory				C S9 A6		C S22 A3
Comprehension			C S7 A18		C S16 A37	
Sequencing and Prediction		C S2 A8	C S7 A1			C S22 A14
Attention and Focus	A S1 A1	C S2 A13	C S7 A21	C S9 A15	C S16 A15	C S22 A42
Language Comprehension – Listening and following instructions	C S1 A2	C S2 A5	C S7 A26	C S9 A17	C S16 A5	C S22 A42
Language Production	C S1 A6	C S2 A8	C S7 A49	C S9 A1	C S16 A28	C S22 A3
Prosody						
Syllables			C S7 A27	C S9 A27		C S9 A27
Rhymes						
Phonemes						
Keep Time – sing or rhyme in time			C S7 A21	C S9 A5	C S16 A28	C S22 A26
Tap a Beat				C S9 A19	C S16 A19	
Tap a Rhythm			C S7 A19			
Body Moving in Time to Music	C S1 A4		C S7 A15		C S16 A20	C S22 A14

Clap or Move at the Right Time	C S1 A6	C S2 A4	C S7 A5	C S9 A21	C S16 A14	C S22 A14
Processing Speed				C S9 A21		
Volitional Rehearsal						
Pleasure/Smiling/ Motivation	C S1 A6	C S2 A4	C S7 A18	C S9 A27	C S16 A35	C S22 A42
Motor Skills – Copying Action	C S1 A1	C S2 A9	C S7 A5	C S9 A5	C S16 A17	
Co-ordination				C S9 A19		
Balance			C S7 A7			
Engagement	C S1 A1	C S2 A6				C S22 A3
Left and Right		C S2 A12	C S7 A12		C S16 A12	
Colours	C S1 A11					
Numbers						
Crossing the Midline				C S9 A21		
Finger/Hand Sucking						
Confident/Comfortable	C S1 A1		C S7 A15			C S22 A49

Participant C was the youngest and not quite four years old. He was present for twenty-three of the twenty-four sessions. He was very quiet and shy at the beginning and sat close to the teacher. He generally didn't answer any questions unless asked individually. By the end of the sessions, he was less shy, and he engaged increasingly over the sessions.

Cognition

Participant C was paying attention as there was a very slight movement of his hand in A1 in the first session which indicated that he was following the instructions. He listened to instructions and moved the parachute as asked in S2 A8, he anticipated and performed the oncoming 'splash.' He watched the P and paid attention to the activities. In S7 when he had H, he was occasionally a little distracted playing with him and not listening to the instructions (S7 A25). He didn't join in S7 A26 with H, he sat on the floor, clapping his hands (Humpty's) and didn't lay on the floor or 'fly'

with the other participants. In S7 A18 he built his bricks differently to that of the P's demonstration as he was not watching her. He had H on his knee. In S7 A21, the bricks were a distraction as he clapped them together instead of listening to instructions. Other than these exceptions he performed all the actions in the songs.

There was evidence that was able to work out a problem, when he carefully squared up two vertical bricks in S7 A18 to enable a roof (triangular brick) to be placed atop allowing the ideal space to prevent collapse and maximise passage. He also assessed the triangle which had one wider side and was most suited for balance and placed it well.

He was able to anticipate where to move next (S7 A48) as per the sequence of the session and moved appropriately. He handed H back to the presenter after the session (S7 A48).

His following of instructions varied; his participation correlated with enjoyment of the activity. In S22 A42, he enjoyed shouting '*grandma*' and enthusiastically performed all the actions in all the activities in S22 and vocalised in A1, A3, A14, A27, A35 and A49.

Language

After picking up bricks for the P, the T said, '*Well done'*, he acknowledged with a nod of his head (S7 A20). His confidence to vocalise grew over time, he asked to

put Humpty on the bus, he interposed '*cluck*' at the right place in S7 A25 and at his turn on the drum (S7 A27) he asked to tap out '*Spiderman*' rather than the suggested 'Captain American'. In the following session he chose '*Iron Man'*. In S16 the P asked if there was anything the children liked to eat. C was thinking about superheroes and said 'Venom'. Thinking he was answering about food, it took some time to decipher what he said [thought he said 'fennel']. His speech was quiet and not clear. The TA worked out it was a Spiderman character. When the P asked what his name was, he replied, '*Peter Parker.'*

He shook Humpty when Humpty's name was sung S7 A49. He conversed with other children but was generally reticent to speak with adults and more so the P than the T. In S9 A6 he said '*splash*' when he jumped. He went '*waa*' for the baby.

In S16 A28 he was mouthing the words to the song and interposed '*swim*' but didn't do the actions.

In the last session the P asked the participants to tell her something about the story, My Cat Ben. She asked C and he responded '*Cat Ben*,' she asked, '*and something else*?' He replied, '*He eats too much*.' The P repeated it and said, '*Yes he does*.' When the P asked, 'What do we say after, *'…left bits all around the house?*' he responded, '*Yeuch*.' He smiled and nodded in response to a question from the P about keeping the mouse on their hands (no verbalisation) at the end of A46. He also only nodded in response to questions about his choice of instrument (A50). In the last session, he sang all through A3 and A49, hello and goodbye songs.

Phonological Awareness

In S7 he correctly said and simultaneously tapped out the syllables to his chosen superhero, Spiderman. In S9 he tapped out Iron Man and ‘alligator’ correctly. In S22 he requested the syllabification activity as he had thought of a new word and wanted to do it. His new character was ‘Venom’ which he said. When asked what he would tap first he chose ‘Peter Parker’, which he did twice and then, ‘Spiderman’ [all from Spiderman films] correctly. He vocalised and tapped simultaneously. When he was asked if he wanted to tap out another, he shook his head.

Motor Skills

In S1 A2 he joined in, moving his arms up and down while holding hands and smiled. In S2 A4 he only moved his body forwards and back and side to side, he didn’t move his arms. On the repeated verse he began to join in and did all the actions. In S2 A14 he held up his hands as asked and followed the directions. He clapped his hands on ‘pop’ at the end.

In S7 A5 he was able to perform actions with H. H performed all the actions to A5, opening and closing his hands, creeping them to his mouth and hiding them behind his back. In S7 A9 and S7 A916 C still didn’t do the ‘open shut them’ with his own hands and didn’t join in until he crept his hands to his mouth and hid them behind his back. In S7 A7 he immediately ‘tiptoed’ as asked. He was able to balance well.

He stamped with his legs straight. He took longer strides for a ‘giant’ taking care to keep his balance and walked slowly for the old man.

He S9 A6 he began to dance when the music started, he remembered what to do.

Timing

S1 A4 his body was moving subconsciously in time to the beat of the music. In S16, A15 and A20 he moved his body to the musical beat. By S22 he was demonstrating ability to keep a beat in several activities – A3, (nodding head to the beat of the music), A14, nodding his head in time to the rhyme and in A46 he synchronised his movements in time to the beat of the music in the second half of the verses. In these examples his whole body was involved in moving to the beat, not only his hands as when tapping claves.

In S2 A4 he performed the actions but not in time. In S7 A19 he started to tap in time with the rhythm [the P was tapping the beat], indicating that he was internalising the rhythm himself, rather than copying the actions. In S7 A23 he was almost keeping the rhythm. In S9 he tapped ‘1 2 3’ in time on his head, arms, ears, nose and knees.

In S9 A21 he was able to cross the midline to touch his elbows with his claves.

Knowledge

He knew the colour blue as he pointed to a blue fish when asked (S1 A11). He didn't point to any other fish. He didn't join in with counting the fish S1 A11).

Engagement

His engagement grew over the duration of the sessions. He was quiet at the beginning and didn't join in. By session nine, he was more engaged, for example, S9 A6 as he joined in the actions and verbalised in some of the verses. He was more confident by the end and was singing and performing actions.

Enjoyment

He smiled on many occasions throughout the sessions and seemed comfortable but not overconfident.

Conclusions/Other Observations

He didn't tend to do actions and verbalising at the same time, other than when tapping out syllables. He followed more actions than verbalisations at the beginning. His confidence grew over the sessions and he began to mouth the lyrics to songs. He was able to give answers but was often reticent to do so. Although initially he didn't vocalise, by S22 he was singing the songs, be it quietly. He engaged well

throughout the program, being attentive and remembering the activities. In S22 he nodded his head to the beat of the music in A3 and the rhyme in A14. Thrice in S22 he requested activities, demonstrating motivation for the program and his increased confidence at the end. He requested the syllabification activity, '*Can I have drum?*' which was performed as soon as he asked; he requested '*instruments*' but it was nearing the end so the P said they would do it tomorrow, he nodded. When the P said they would do the bus activity he asked for '*aeroplanes*' so aeroplanes was performed instead. He did all the actions and clearly enjoyed the activity.

He demonstrated competence in cognitive skills and the activities drew his attention. His language skills improved over the sessions. He was able to tap out syllables and his ability to keep a beat improved; in the last session he was keeping a beat. He was able to cross the midline. There were no red flags for literacy learning.

Figure 10.

Participant J Literacy Profile

Early Literacy Skill Development Knowledge and Skills and Contributory Factors to Literacy Learning						
Sessions	1	2	7 ABS	9 ABS	16 H	22 ABS
Skills						
RAN						
Memory	J S1 A10	J S2 A6			J S16 A5	
Comprehension						
Sequencing and Prediction	J S1 A3	J S2 A8			J S16 A22	
Attention and Focus	J S1 A4	J S2 A4			J S16 A30	
Language Comprehension – Listening and following instructions	J S1 A2	J S2 A4			J S16 A 29	
Language Production	J S1 A5	J S2 A5			J S16 A21	
Prosody	J S1 A6					
Syllables						
Rhymes						
Phonemes						

Keep Time – sing or rhyme in time	J S1 A5	J S2 A4			J S16 A5	
Tap a Beat					J S16 A19	
Tap a Rhythm					J S16 A21	
Body Moving in Time to Music						
Clap or Move at the Right Time	J S1 A5	J S2 A12			J S16 A35	
Processing Speed		J S2 A12				
Volitional Rehearsal	J S1 A6					
Pleasure/Smiling/ Motivation	J S1 A5	J S2 A8			J S16 A35	
Motor Skills – Copying Action	J S1 A6				J S16 A21	
Co-ordination		J S2 A9			J S16 A21	
Balance						
Engagement						
Left and Right		J S2 A12			J S16 A12	
Colours	J S1 A11					
Numbers						
Crossing the Midline						
Finger/Hand Sucking Yawning	J S2 A9	J S2 A9				
Confident/Comfortable						

He was present for sixteen out of the twenty-four sessions. He asked for Humpty and was happy to have him for the session. He showed him to the boy next to him and waved Humpty's hands for the welcome song (S 16 A1). He was able to understand spoken language and to speak in sentences. His attention was sometimes elsewhere, and he didn't join in with some of the activities. He did however, appear to enjoy himself, he smiled a lot and was quite vocal. He appeared quite confident and comfortable.

Cognition

He followed some instructions and performed some of the actions to the songs (S1 A1, 4, 5 and 7). He didn't seem to know the song 'One, two, three, four, five', yet other children did in S1. In S2 he looked at his finger and held it out, indicating that

he had heard the song before. He didn't count when invited to count together. He watched and smiled.

He followed all the actions with Humpty S16 A5. In S16 A21 he chose to tap the claves on his toes when asked and did so. Later when he was supposed to tap his knees, he tapped his toes. He crossed his arms to tap his shoulders, but the claves didn't touch his shoulders. He anticipated walking the claves for A22 in S16 as the P was explaining the actions. When the song played, he took his claves into the middle the first time, but the second time he stayed sitting on the edge of the circle and danced the claves on Humpty.

In S16 A30 he ignored the activity and held a play fight with Humpty. Sometimes he ignored instructions; he was asked to let go of the parachute and didn't (S1 A8) and asked to move backwards out into the circle and didn't (S16 A50). He did move back when asked in S16 A22 and A24. In S16 A28 he didn't do any actions but swung Humpty around. Also, in A14 he was distracted and didn't appear to listen to the P or do any actions.

In S16 A39 he linked the H he was holding and the song and spoke about him. Also, when H's name was sung (S16 A3 and A39) he held him forwards. When playing the instruments, he played the wooden octachime when the triangle as asked for.

Language

He appeared to understand what was asked of him. He chose to not always follow the instructions. He was able to communicate verbally his feelings and what he wanted.

In S1 he was asked if he liked activity 5. He turned to the T and said, '*I liked that*.' He smiled widely and when the P said, '*Shall we do it again?*' he smiled and nodded. In S2 A5 the P in response to his excited squeak said to him, '*You don't want to bite your fingers, do you?'* He responded, '*I don't want it bite.'* When the P sang 'hello' to Humpty, he cheered '*Yo, whey hey*'. In S2 for A5 he laughed and said, '*I like that'* and asked, '*I want to do that again.'* In S16 A21 he said, '*What about me?'* when he didn't have any claves. When the instruments were put out, (S16 A50) he pointed to himself when the guiro was demonstrated but didn't verbalise. When bells were demonstrated he didn't move or speak. When the octachime was demonstrated he wanted it. He moved towards it and said, *'I want that please, I want it'.* He was given it and began to play it. The TA asked him to wait. He was quiet momentarily but started to play it again quietly. In S16 A39 the song was about Humpty. He held him up and said, '*Humpty, I've got him.'* He was learning the lyrics and interposed '*eat*' in S16 A 35.

Phonological Awareness

Due to absence, there was no video of him doing the syllable activity.

Motor Skills

In S16 A7 he didn't walk on his toes, but he stamped on 'stamp'. He didn't do giant strides; he went back on his toes (possible review). He was able to copy actions as in S16 A 21, tapping and moving claves to the left and right but not at the right time. He chose to tap the claves on his toes and did so. Later when he was supposed to tap his knees, he tapped his toes. He tapped one clave on one elbow instead of two claves on two elbows.

In S16 A29 he enjoyed doing the actions with H and said '*high*' at the end. He didn't reach to the ground, but did the other three actions, holding Humpty's arms to do the actions.

Timing

In S1 A5 he performed the actions but not in time. In S16 A5 he performed the actions mostly in time. He jumped on time to 'splash' in S1 A6. He was able to add a single action or word at the right place, for example in S16 A35 he shouted '*eat*' correctly at the end of the chorus. In S16 he didn't do any of the actions in time with the beat (Activities 16, 21 12 and 35). He wasn't able to tap claves repeatedly to a beat or rhythm consistently. In S16 A19 on the repeat of the song he did appear to tap the beat in time, unsure it was deliberate or not.

Knowledge

In S1 he was asked, '*Can you see a blue fish?*' He repeated, '*Blue fish'*. When asked to pick up a yellow fish, he picked up a purple fish. The teacher encouraged him to put it down and showed him a yellow fish. He picked up the yellow fish and then picked up the purple one again. In S2 he picked up an orange fish when asked.

In S16 A12 he didn't know which was his left or right, but when the P told him, he was able to swap left and right as asked. He swapped arms quickly when asked but did not join in the actions with the song.

Engagement

He engaged fully with some activities and actions and not others. He smiled a lot, in most activities. He yawned at some point in each session.

Conclusions/Other Observations

After A6 in S1 he continued to make motorbike noises after the song was finished, this was maybe volitional rehearsal, slow processing or he just enjoyed it. There were red flags for literacy learning – he did not appear to know colours, there was no evidence that he could keep time, he sometimes didn't respond to requests, (for example to move) and seemed in his own world, lack of focus sometimes. He had a high rate of absence, being absent for a third of the sessions.

Figure 11.

Participant LE Literacy Profile

Early Literacy Skill Development Knowledge and Skills and Contributory Factors to Literacy Learning						
Sessions	1	2	7	9	16	22 ABS
Skills						
RAN						
Memory			LE S7 A49		LE S16 A49	
Comprehension			LE S7 A26			
Sequencing and Prediction			LE S7 A26	LE S9 A8		
Attention and Focus			LE S7 A3			
Language Comprehension – Listening and following instructions	LE S1 A1	LE S1 A4	LE S7 A5	LE S9 A5	LE 16 A21	
Language Production	LE S1 A6		LE S7 A25		LE S16 A35	
Prosody			LE S7 A15			
Syllables			LE S7 A27			
Rhymes						
Phonemes						
Keep Time – sing or rhyme in time	LE S1 A4	LE S2 A12				
Tap a Beat			LE S7 A19	LE S9 A21		
Tap a Rhythm				LE S9 A20		
Body Moving in Time to Music			LE S7 A3			
Clap or Move at the Right Time	LE S1 A6		LE S7 A5	LE S9 A15	LE S16 A30	
Processing Speed				LE S9 A27		
Volitional Rehearsal	LE S1 A11		LE S7 A21			
Pleasure/Smiling/ Motivation			LE S7 A26	LE S9 A15		
Motor Skills – Copying Action			LE S7 A28	LE S9 20	LE S16 A7	
Co-ordination						
Balance	LE S1 A7		LE S7 A7		LE S7 A16	
Engagement	LE S1 A5					
Left and Right		LE S2 A12	LE S7 A12	LE S9 A12	LE S16 A12	
Colours	LE S1 A11					
Numbers					LE S16 A30	
Crossing the Midline				LE S9 A21	LE S16 A21	
Finger/Hand Sucking						
Confident/Comfortable						

Participant LE was present at twenty-three of the twenty-four sessions.

Cognition

Although he looked as though he wasn't listening (looking away or into space, not at the P) on several occasions (S7 A3, A21; S7 A7) he was able to respond to questions, demonstrating that he was listening. When the P was explaining when to clap (S7 A5) he clapped his hands repeatedly appearing not to be listening, he did clap at the right time however. In S7 he was ready with his hands closed and looking at the P for the song to start (A5).

In S7 A21 when the song finished, he started to hit bricks together very hard. The T asked him to sit down and join the group. He was sitting but facing away from the circle.

In S7 A12 instead of joining in with the song he played at hiding the foam hand behind his back and sitting on it. In S7 A26 he initially found himself a good space but then changed his mind and pushed himself between other children, taking their spaces.

In S7 for the goodbye song (A48) he went on his hands and knees and wiggled around instead of sitting in the circle. Although he usually followed instructions, when asked to make a bridge (S7 A18) he didn't; both the P and the T asked him. [He was thinking about something else] The P was explaining the final construction,

he said '*Look, look'*, the T asked him if he was listening. There was nothing to look at, his bricks were on the floor. He made the last construction, a tower and exclaimed '*Whoa'* when another boy's tower fell.

In S7 A21 he didn't follow the instructions he ignored the teacher's questions and tried ways of constructing his bricks. This was another occurrence of volitional rehearsal.

Language

He was able to understand and follow instructions In S1 A1 he looked at the P the whole time and waved his arm confidently. He was eager to answer questions (S1 A6).

The presenter asked if anyone remembered the song about the turtle (S7 A15), he bounced on his knees and made strange noises. When the P collected the foam hands he said '*No, not me'* and hid the hand behind his back. The T took it from him; he looked for it. In S7 A25 a girl asked to hold the book for the activity, he shouted, '*Wait.'* The P said she was going to hold it. He struggled to make the sentence, '*I want to hold that.'* He stammered on 'I' in his rush to get the sentence out. In S7 after 'Aeroplanes (A26) he said, '*I want to do the bus.'* Then he went to the P and repeated his request. She told him they would do it later and they did. He nodded in response.

His speech was often difficult to comprehend and he often repeated himself. For example, in LE S7 A12 he asked, '*Can I have a red one?*' '*I want a red one'*, he pointed at the hands and said, '*red one'* and held out his hand. He also spoke to himself, he constructed a house with three bricks (S7 A18) and said to himself, '*That work'* when he completed it.

Phonological Awareness

In S7 A27 when asked what he would like to tap out he said, '*I can do Iron Man'* when asked to do it he said and beat out '*I am Iron Man'* correctly. In S9 he chose 'Hulk'.

Motor Skills

He yawned and tried to hold and lay his face on a girl's foot (S7 A26) which was moving in front of him. In S7 A7 he performed tiptoeing, stamping, striding (maintained good balance) and walking slowly and bent with a stick as per instructions and made fluent transitions between his gaits. His performance at this activity improved from S1 thought S7 and to S16. His movements were more tentative at the beginning, slower and smaller strides. By S16 they were more definite and confident.

He could tap bricks together behind his back (S7 A21).

Timing

In S1 A4 he moved his arms up and down as per the lyrics but not in time to the song, he moved side to side in time with the lyrics but then when the P was instructing ‘up and down’ he moved side to side again. In S1 A6 he jumped for ‘splash’ but not in time with the song.

In S7 A3 the music started prematurely, and he nodded his head in time to the music. When it started again, he nodded his head and moved his body in time to the introduction.

In S7 A19 he tapped his bricks in time, then dropped them to the floor. In A20 he didn’t join in the first verse but continued to repeatedly drop the bricks to the floor. In S7 A21 he placed the bricks as per the instructions but not in time.

He was able to ‘clap’ a single clap in a given space (S7 A5) also repeated claps (1, 1 and 2, 1, 2 and 3 and 1, 2, 3 and 4) Hickory Dickory Dock (S22 A30). He performed the actions in time (S7 A5) for the first verse but missed the beginning of the second verse. He clapped three times in time for ‘on your lap’. He could also interpose single words at the right time, ‘*cow’* in S7 A25 and three consecutive repeated words ‘*moo, moo, moo’* in S7 A25. In this activity he also added ‘baa, baa, baa’ (didn’t add ‘sheep), ‘pig’ and pig noises in the right place, also the noises for chicken and duck. He also rocked side to side in time to the music.

In S9 A27 he was processing his thoughts before speaking. Although another boy was talking about a film he had watched, LE referred to something he watched and said, '*I saw it before'*. The P and TA assumed he was referring to the other boy's choice as it was then his turn, but he wasn't. He was referring to his own choice for tapping out syllables, 'Hulk'.

Knowledge

The children were asked to read numbers on the wall, (S1). When the numbers were counted to ten, he said, '*I'm ten'.* He said it three times until he got a response. The P responded, '*You're ten? You're very grown up then'.* He identified the numbers 1-4 (was unsure about 4). He knew left and right, a little confused the first time but right every time after that A12 in S2, 7, 9 and 16. He knew the colours blue and yellow and picked up corresponding fish when asked (S1 A11).

Engagement

LE smiled at the parachute being introduced for the next activity (S1 A8). He smiled while 'flying' S7 A26. He was pleased with his building efforts with the bricks (S7 A18) he said, '*done'* and '*argh'* and raised his hand and finger. He enjoyed singing and tapping bricks in S7 A20, he sang the '*la, la'* section. He slid to his place in S7 A15 (the bus). When the song was repeated, he slid into his place again and said '*whoo*'. He particularly liked A 28, he did the actions (S7) and asked to hold the

picture of the turtle (S7). In S1 A5 the P asked, '*Do you like that?*' he responded with one quick nod.

Although he didn't do any actions in S1 A9, he did engage with all the other activities.

Conclusions/Other Observations

In S7 A12 he touched his foam hand next to the girl's next to him and he smelled the hand. In S1 A11 he held the fish to his head like ears and jiggled them, he was maybe re-enacting a different rhyme (rabbit's ears were referred to by another girl at a different time). Speech impairment was a red flag to literacy learning and his seeming otherwise engaged and barely being able to sit still quite frequently. However, despite often not looking as if he was paying attention, he mostly was. He was sometimes seen to be acting out one of the activities at a different time to when it was being performed in the group (volitional rehearsal), for example, in S1, A11 and S7, A21. He was able to clap a number of claps within a song and tap out and say syllables simultaneously. He also interposed rhyming words, indicating a possible awareness of rhyme. His willingness to engage with the activities demonstrated a willingness and motivation to learn.

Figure 12.

Participant M Literacy Profile

Early Literacy Skill Development Knowledge and Skills and Contributory Factors to Literacy Learning						
Sessions	1	2 H	7	9	16	22
Skills						
RAN						

Memory	M S1 A10		M S7 A28	M S9 A1	M S16 A5	M S22 A42
Comprehension		M S2 A8	M S7 A5			M S22 A37
Sequencing and Prediction			M S7 A18		M S16 A21	M S22 A14
Attention and Focus	M S1 A1	M S2 A13	M S7 A5		M S16 A24	
Language Comprehension – Listening and following instructions	M S1 A4	M S2 A5	M S7 A1	M S9 A15	M S16 A35	M S22 A35
Language Production	M S1 A6	M S2 A5	M S7 A1			
Prosody						
Syllables			M S7 A27	M S9 A27		M S22 A27
Rhymes						
Phonemes						
Keep Time – sing or rhyme in time			M S7 A21			
Tap a Beat					M S16 A39	
Tap a Rhythm						
Body Moving in Time to Music			M S7 A3	M S9 A19	M S16 A5	
Clap or Move at the Right Time	M S1 A8	M S2 A5	M S7 A5			
Processing Speed						
Volitional Rehearsal			M S7 A48			
Pleasure/Smiling/ Motivation	M S1 A1					
Motor Skills – Copying Action					M S16 A5	
Co-ordination			M S7 A20			
Balance				M S16 A7		
Engagement						
Left and Right		M S7 A12	S7 A12	S7 A12	S7 A12	
Colours						
Numbers	M S1 A9				M S16 A30	
Crossing the Midline						
Finger/Hand Sucking	M S1 A9	M S2 A12			M S16 A1	
Confident/Comfortable			S7 A48			

Cognition

She remembered and interposed ‘Sounds and Symbols’ each time the P used cloze (S16 and S22). She remembered the actions to A5 subsequent times. She interposed ‘pop’ (S16 A14) and clapped her hands on the floor at the right time. In

S16 she didn't join in with the actions (A14) and was playing with her pockets, but she was listening and joined in at the end. She tended to join in the end of rhymes and songs rather than the beginnings. In S16 A21 she anticipated 'in the air' before the P did the action and put up her arms.

Language

She identified a picture of a puppy as a dog in S1 A6.
In S2 A4 she said, '*Again'.* The P looked at her and repeated 'Again?' she nodded in response.

She shook her head and nodded in answer to '*Do you want to do that one again?'* S2 A5. She did this a few times. She mouthed '*Sounds and Symbols'* in the right place (S7 A1).

In S9 A27 she tapped her chest but didn't speak to indicate that she wanted a turn of the drum while it was someone else's turn. When the boy finished, she said, '*I want Iron Man'*. She also pointed to herself to ask to be the driver for a second time in S7 A15 with no verbalisation. In S7 A28 she tugged the turtle picture from the P, she didn't speak. The P let her have it.

After S9 A 27 the P asked her if she wanted '*Bus or Tiny Tim?*' she replied, '*Bus*.'

Phonological Awareness

In S7 A27 she tapped the drum five times for ‘Captain America’. She did it correctly the second time with a little help [scaffolded]. In S9 A27 she tapped ‘Iron Man’ correctly. She was reticent to do ‘alligator’ and shook her head when asked earlier if anyone wanted to try it. When it was her turn, she hit the drum very hard six times. The P slowed her down and sounded out ‘al-li-ga-tor’. She hit the drum seven times. The P asked her to listen to the sounds and demonstrated saying ‘alligator’ and hitting the drum. M hit the drum and at the same time said ‘*al-li-ga’*. The P encouraged her to finish with ‘tor’. M said, ‘*Al-li-ga-tor’* and beat the drum in time, four times. The P said, ‘*Fantastic*’. In S22 she chose ‘Super Girl’ and beat the drum to the 3 syllables twice. A third time she said ‘Super Gi-rl’ rolling the ‘r’ and making an extra syllable, and therefore hitting the drum four times. She was listening for the sounds, which was what was wanted.

Motor Skills

In M16 A7 she was unbalanced. She walked on her toes but with her toes pointed inwards and she crossed her feet over as she walked. She could only take one giant stride without overbalancing. She ‘held’ a walking stick and took short steps for an old man.

Her arms were not co-ordinated in S7 A20 when waving them side to side for ‘la, la’.

Timing

In S7 A3 the music started prematurely, and she moved her body in time to the music, she laughed with the teacher at the mistake. Her body moved in time also in S16 A5 and in S9 A19. She wasn't in time when she started rocking but became in time [entrainment]. Although her body was moving in time S9 A19, her tapping wasn't.

In S1 A8 she splashed on cue. S2 A5 she said and clapped at the right time, the second time it was sung and when scaffolded and the same in S7. In S7 A3 she sang her name at the right place and time in the song and laughed when her name was sung. She clapped on her knees but not in time in S16 A5 and twice not three times 'on your lap.'

She was able to interpose a single word on time '*stop*' in S7 A19, (also, S22 A35) but not to tap in time to a beat or a rhythm. In S7 A20 she was still tapping her bricks when the lyrics moved on to 'la, la'. [processing speed]. When she caught up, she didn't wave her arms together, but separately [co-ordination].

Knowledge

She maybe didn't know the colour 'purple'. When asked to pick up a purple fish, she looked but didn't pick it up until the TA pointed it out to her. When asked, '*How many fishes can you see?'* She correctly said, '*Three*' in S1 A9.

In S16 A30 the P asked LE what the number 2 was, M replied '*five*'. The P said, '*two, this one's two'*. It was facing her so it shouldn't have been confused with the number five.

In S2 she seemed unsure of L and R. In session 7 she got it right [maybe chance]. Thereafter she seemed unsure.

Engagement

M was eager to engage in all the activities and also to answer questions. She wanted to please and she enjoyed participating. When she was unsure, she remained quiet and passive.

Conclusions/Other Observations

Before moving to sit in a circle in S7 A48 for the goodbye song, she moved her arms up and down, she was remembering an introduction song when sitting in the circle and was rehearsing volitionally. She had also remembered A22 from a previous day when A21 started, and she was given claves; she began to dance her claves in S7 A21.

She frequently looked at others or the T or TA for reassurance S7 A5. She often smiled and laughed, sometimes it may have been nervously, she laughed with the P when the P said, '*I don't have a big fish'*. She was happy to dance with Humpty

in S2 A6; she jumped and wiggled with her tongue out and smiling. She enjoyed ‘flying’ in Aeroplanes and ran around smiling and landed her plane with an audible ‘*ooh*’. She asked to be the driver of the bus in S7 A15; she rocked side to side and enjoyed driving the bus.

In S1 A9 she was sucking her thumb. In S2 A6 she didn’t do the actions as she was playing with her nose and in S2 A12 she was sucking her thumb. She quite often had her fingers in her mouth, for example in S16 A1. In S9 12 she was chewing a laminated number. Also, in S22 A28, she sat with her hands in her mouth. The TA asked her to take them out ‘as she couldn’t hear her lovely singing voice’.

She tended to lack confidence. She was asked in S7 A12 ‘*Do you think we can do it?*’ referring to the LH RH song. She shook her head. She shook her head also in S7 A28 when asked if they could sing the Turtle song and again if they wanted to do it again, also, in Syllables S9 A29 when she was asked if she wanted to tap out ‘alligator’. In S7 A48 the P noticed she was doing actions to the ‘Up and Down song’ as she walked towards the circle and asked if she wanted to do it. She nodded and then said ‘*No*’.

In S22 A37, she asked the P to move the string round her triangle to the corner [something she could easily have done herself].

Red flags for literacy learning included, not being able to keep a beat, struggled to keep time. She was a little immature (chewing her fingers) and looking for

support/approval. However, she was eager to participate, offered answers often and remembered names of instruments and characters in the songs (Rover, but not Tiny Tim).

Figure 13.

Participant L Literacy Profile

Early Literacy Skill Development Knowledge and Skills and Contributory Factors to Literacy Learning						
Sessions	1	2	7	9	16	22
Skills						
RAN						
Memory		L S2 A6	L S7 A18		L S16 A1	L S22 A22
Comprehension			L S7 A18	L S9 A15		L S22 A44
Sequencing and Prediction		L S2 A5	L S7 A5	L S9 A5		
Attention and Focus	L S1 A1	L S2 A13	L S7 A1			
Language Comprehension – Listening and following instructions	L S1 A7	L S2 A9	L S7 A5	L S9 A7		
Language Production	L S1 A9	L S2 A6	L S7 A25	L S9 A28	L S16 A1	
Prosody		L S2 A6				
Syllables			L S7 A27	L S9 A27		L S22 A27
Rhymes					L S16 A35	
Phonemes						
Keep Time – sing or rhyme in time		L S2 A5	L S7 A5	L S9 A21		
Tap a Beat				L S9 A20		
Tap a Rhythm			L S7 A5	L S9 A19	L S16 A21	L S22 A46
Body Moving in Time to Music	L S1 A6	L S2 A10	L S7 A25			
Clap or Move at the Right Time		L S2 A8	L S7 A21	L S9 A5		L S22 A14
Processing Speed						
Volitional Rehearsal						L S22 A27
Pleasure/Smiling/ Motivation		L S2 A6	L S7 A3		L S16 A3	L S22 A35
Motor Skills – Copying Action		L S2 A13	L S7 A7		L S16 A14	L S22 A45
Co-ordination				L S9 A21		
Balance						
Engagement	L S1 A8	L S2 A5	L S7 A7	L S9 A1		L S22 A14
Left and Right		L S2 A12	L S7 A12	L S7 A12	L S7 A12	
Colours	L S1 A11					
Numbers		L S2 A9				
Crossing the Midline				L S9 21		
Finger/Hand Sucking				L S9 A1		L S22 A1
Confident/Comfortable						

Cognition

Participant L remembered the word ‘splash’ in S2 from the previous session (S1) and said it when asked. In S7 A18 he remembered that previously he had to make a house with the bricks and began to do this. He was able to understand when the P explained a different way to construct the bricks and followed her instructions and understood the need to match the flattest side with the rectangular bricks to make a roof. He hadn’t listened well when the P said to build an arch, he built a tower, but changed his construction when he realised. He was maybe following actions more than words. When the third brick fell off, he tried again and made sure it was secure before letting go again.

In S16 A1 he remembered the name of a ‘semicircle’ when the P asked for the shape of how they were sitting. In S22 he remembered that the P liked macaroni cheese.

In S7 A5 he began doing the actions before the P. He anticipated some of the actions but not all. He anticipated the ending and clapped before anyone else, including the P, in S2 A14.

In S1 he didn’t join in actions for A1; he just observed. It was difficult to know if he was paying attention as he didn’t respond to instructions. He only moved when someone took his hand. In S2 he became distracted with the parachute (A13) and the P said his name to refocus his attention. In S7 he still only watched. He moved backwards when asked (A1).

In S9 A15 he realised there was no room on the sofa and went to find himself a bus stop. In S22 A44 he looked to work out if the P was free to help to fix his mouse, if not, he went to the PA.

Language

He followed instructions S2 A9 with his hands ready to 'go fishing'.

In S1 A7 he held a pretend walking stick and walked slowly. The P asked him, '*Did you like that?'* he smiled and nodded.

In S1 A11 the T repeated the P's question for him, '*Can you see an orange fish?*' He nodded and picked up the fish and held it up when asked. When the P was looking for an orange fish, he picked it up and put it with the others.
He didn't make verbal responses in the first session. In S2 he jumped on 'splash' (A6) but didn't verbalise. He was smiling. He said, '*moo*' for the cow verse, he did the action for 'munch' but didn't verbalise it, he made the baby noise increasing in volume for that verse and held 'handlebars' for the motorbike verse. At the end of the song he said, '*Motorbike has two hands'* and held up clenched hands, the P replied, '*Two hands, you do need two hands for a motorbike'*.

In S7 A25 he interposed '*sheep*' in the song. In S7 he was asked the turtle's name. He screwed up his face in thought but didn't answer. He interposed '*swim*' in S7 A28. When the song was repeated, he didn't make any sounds or movements. The

same for S7 A49. In S16 he interposed '*Tiny Tim'* and sang, '*drank…'* In S22 he also interposed '*Tiny Tim'* but didn't sing the song. He had the picture and waved it about as if the turtle was swimming.

In S7 A3 he said his name quietly when it was sung, when prompted.

In S9 A22 the TA asked which superhero he liked and suggested 'Batman' for him. He nodded and said, '*I watched it before'*. He tapped out the syllables correctly and spoke the word quietly. He also did al-li-ga-tor very confidently and loudly striking the drum four times.

In S22 A27 the boy next to him spoke about Spiderman. He said, '*Yesterday I sayed Batman'*. The P thought he'd said he saw it and asked him a question about the film. He said, '*No I sayed it'*. He had to repeat it again and the TA had to clarify. Finally, the P said, '*Oh you told me last time?*', he nodded. This time he chose 'al-li-ga-tor'. He said it quietly and struck the drum correctly with each syllable.

He interposed many rhyming words in S16 A35 and also '*eat*' at the end of the chorus. When the song started, he seemed to be mouthing the words. He enunciated audibly the rimes at the end of each verse and shouted '*eat*' at the end of each chorus.

In S22 he did all the actions to A42.

Phonological Awareness

He went wrong the first time, so the P did it with him [scaffolding]. He hit the drum on each syllable the second time S7 A27. Also as above, in S22 A27.

He interposed many of the rhyming words in S16 A35 – mouse, house; of course, stead, train, gain; day, play. When it was repeated, he did day, play; mouse, house; horse, course; he moved as if to interpose belly, but didn't, but did say 'jelly'; leg, stead; train, gain. He only enunciated the end syllables which were the rimes, he didn't say the whole words. The were all at the right place at the right time. He shouted '*eat*' at the end, a little early [excitement].

Motor Skills

In S7 A7 he walked on tiptoe, copying the P, he bent his knees to stamp as requested, he lengthened his stride of giant strides (but not very long) and moved slowly for the last line (no bending or walking stick).
In S16 A15 he 'drove' the bus, rocking from side to side. He watched each passenger board the bus.

Timing

S2 A5 He began to open and shut his hands when the song was repeated. He opened and shut them for the first line but struggled for the second. He waved

randomly for the chorus of Alley O (S2 A13). In S7 he opened and shut his hands but not in time. (A5) When the song was repeated, he opened and shut his hands at the right time.

S7 A19 He tried to copy the same beat as the P and was close. Also, in A20, he moved them side to side for ‘la, la’ on time. In A28 the P suggested moving side to side with the beat of the music as well as the actions. He didn’t sing or do the actions but moved side to side in time with the song throughout the song. In A5 he clapped to ‘on your lap’ a little out of time but the right rhythm. He did the actions and ‘pop’ on time (not verbalising) S16 and S22 A14. He was able to anticipate and jump on ‘splash’ on time S2 A6. He was nodding his head to the beat in S2 A10. In S7 A25 he moved his body in time with the beat.

In S9 A19 he picked up the rhythm (not the beat as the P) and tapped his claves in time. He was not in time when the song was repeated. In S16 he could tap his claves to 1, 2, 3 consistently.

Knowledge

He picked up an orange fish when asked (S1 A11) and a green fish when asked (S2 A11). He would have picked up a purple one too if the P hadn’t asked him to stop.

Left and right – S16 A12 he was unsure.

He counted on his own volition, mouthing the numbers from the wall at least 1-8.

Engagement

He smiled when his name was sung in S7 and S16 A3. In S7 A5 he laughed as he hid his hands behind his back in the song.

He grew in confidence over the sessions and spoke more each day. He observed and then participated. In the last session he was very engaged, especially in A35 where he interposed and possibly mouthed many of the lyrics.

Conclusions/Other Observations

He was maybe uncertain at the beginning. In S1 he had his hand on another boy's shoulder in A6.

As he had finished his turn tapping syllables in S22 A27, he looked at the numbers on the wall and pointed to them. He read them aloud to himself [volitional rehearsal]. He put out his finger maybe to guide his vision after 1, then mouthed up to 8. He was simultaneously listening to what was going on and put his hands over his ears as a boy hit the drum. He looked at the numbers and seemed to be mouthing them again.

There were no red flags for literacy learning.

Figure 14.

Participant CA Literacy Profile

Early Literacy Skill Development Knowledge and Skills and Contributory Factors to Literacy Learning						
Sessions	1	2	7	9	16	22 H
Skills						
RAN						
Memory			CA S7 A18			CA S22 A1
Comprehension			CA S7 A18		CA S16 A39	
Sequencing and Prediction		CA S2 A6			CA S16 A30	
Attention and Focus	CA S1 A1	CA S2 A14	CA S7 A1	CA S9 A6	CA S16 A12	CA S22 A35
Language Comprehension – Listening and following instructions	CA S1 A3	CA S2 A2	CA S7 A1	CA S9 A6	CA S22 A29	CA S22 A26
Language Production	CA S1 A3	CA S2 A6	CA S7 A1		CA S16 A50	CA S22 A35
Prosody			CA S7 A27		CA S16 A37	
Syllables			CA S9 A27	CA S9 A27		CA S22 A27
Rhymes						
Phonemes						
Keep Time – sing or rhyme in time			CA S7 A5		CA S16 A5	CA S22 A30
Tap a Beat				CA S9 A3		
Tap a Rhythm						CA S22 A35
Body Moving in Time to Music			CA S7 A28			
Clap or Move at the Right Time	CA S1 A6	CA S2 A2	CA S7 A21		CA S16 A5	CA S22 A28
Processing Speed	CA S1 A7			CA S9 A3		
Volitional Rehearsal						
Pleasure/Smiling/ Motivation	CA S1 A8	CA S2 A2	CA S7 A21			CA S22 A44
Motor Skills – Copying Action		CA S2 A9	CA S7 A7	CA S9 A20	CA S16 A7	CA S22 A42
Co-ordination						
Balance						
Engagement	CA S1 A4				CA S16 A28	CA S22 A42
Left and Right		CA S1 A12	CA S7 A12			
Colours	CA S1 A11	CA S2 A12				
Numbers						
Crossing the Midline				CA S9 A21		
Finger/Hand Sucking			CA S7 A28			
Confident/Comfortable	L S1 A6					

Cognition

He listened and looked at the P and was well focussed. In S9 A5 he responded to the P's actions before she spoke and copied the action.
His level of engagement was related to his speed of processing. For example, in A12 he had to swap hands quickly holding out left and right arms. He was unsure of left and right and couldn't do it quickly.

He thought of answers to questions. For example, in S16 the P asked about the cat's colour. He must have heard 'collar' and said that it was blue. The cat's colour wasn't mentioned previously so it was not something remembered.

It wasn't easy for him to do actions and words simultaneously. In S7 A27 he spoke but didn't hit the drum. The timing must go together. In A6 he tended to do actions or lyrics but not both together. In S16 A28 he sang, '*drank up all the water'* and mouthed, '*soap*' but didn't do any actions. However, in S22 he was singing and tapping his knees in A35.

He memorised more lyrics over time.

He understood to play when the material of his instrument was mentioned and played at the right time (S16 A39).

Language

He didn't vocalise unless invited to do so. He didn't ask any questions or proffer any unsolicited information. He didn't answer any questions unless asked individually. He didn't vocalise at all in S1. In the second session he began to respond to the cues to interpose responses and did so quietly. In S7 A25 he said, '*Quack, quack'*. In S16 and S22 he could be observed to be singing quietly or mouthing words in A1, A2, A5, A28 and A35.

He learned the lyrics to songs over the time. In S22 he sang quite a few words of the song in A35, he sang, '*My cat Ben chased a train'* and '*home again*.' In the chorus he was mouthing the words and tapping his hands on his knees.

He showed awareness of prosody in music playing strongly for 'thunder', quietly for 'raindrops', slowly for 'blue skies' and quickly for 'hurry'.

In S16 A50 he repeated the word 'guiro' when asked to do so, he held out his hand [gesture] to ask for the guiro [no vocalising] but later when the P asked him again what it was called, he correctly remembered and said, '*Guiro*'.

Phonological Awareness

In S7 A27 he chose 'Captain America' again to tap syllables to. He was unsure. He said, '*Captain America'* but didn't hit the drum. The P held his hand and did it with

him saying and beating out ‘Cap-tain A-mer-i-ca.’ He began again speaking but not hitting the drum. The P slowed him down and said it with him, while he spoke and hit the drum [scaffolding]. In S9 he chose ‘Hulk’. He enunciated and tapped out two syllables ‘*Hu-lk’*. The P said, ‘*Hulk*’ and demonstrated with her hand on her knee. He did it correctly. Then he also tapped out ‘Captain America’ correctly; the P spoke it with him to support the syllabification [scaffolding]. He said, ‘*alligator*’ and hit the drum three times. The P asked, ‘*again*’ – he corrected himself and did it independently and correctly with no support. In S22 he chose to beat out the syllables to ‘Batman,’ which he did correctly. The P asked if he’d like to do another one. He chose ‘Spiderman’. He said ‘*Spiderman*’ but beat the drum on ‘der’ and ‘man’. The P asked him to do it again. He did it correctly and independently the second time. The P said, ‘*Good boy, well done*.’ He picked up the rhyming words quickest in the lyrics.

Motor Skills

His movements were very timid at S1 but by S16 he was making larger more confident movements, for example waving in A1. He also waved in A2, more as the sessions went on.

He took measured strides in S16 A7 for the giant strides, so as not to overbalance. He was aware of his limits.

Timing

In S9 A6 he jumped on ‘splash’ at the right time, thrice as he was anticipating it. He did all the actions. In S16 A5 he opened and shut his hands the correct number of times but not in time with the song. He clapped at the right time. In S22 A35 he was almost tapping his hand to the rhythm in the chorus.

Knowledge

He knew colours (green and yellow) but was slow to demonstrate this knowledge. Up to and including S7 he didn’t offer the correct hand when asked. In sessions 9 and 16 he put out the correct hand when asked.

There was no direct questioning with regard to numbers and he didn’t offer any information.

Engagement

He engaged well in the program with regards to following instructions and learning the song melodies and lyrics. He engaged most in activities he enjoyed, for example A6 where in S9 he sang, *‘… have to go moo’* and performed the actions. He didn’t engage at all in any answering of questions which were posed to the whole group.

Conclusions/Other Observations

He appeared to enjoy the program; he smiled at many activities and gave authentic answers when asked questions. He was slow to pick up the timing of activities which impeded his ability to join in. He didn't keep a beat or rhythm but was beginning to entrain to a beat in S9 A19.

There were no red flags. He demonstrated cognitive skills, language skills [quietly] and ability to perform an action in time, although not to keep a beat.

Figure 15.

Participant AV Literacy Profile

Early Literacy Skill Development Knowledge and Skills and Contributory Factors to Literacy Learning						
Sessions	1	2 ABS	7 ABS	9 H	16 ABS	22 ABS
Skills						
RAN						
Memory	AV S1 A10			AV S9 A1		
Comprehension				AV S9 A1		
Sequencing and Prediction						
Attention and Focus	AV S1 A8					
Language Comprehension – Listening and following instructions	AV S1 A5			AV S9 A1		
Language Production	AV S1 A6					
Prosody						
Syllables				AV S9 A27		
Rhymes						
Phonemes						
Keep Time – sing or rhyme in time				AV S9 A10		
Tap a Beat				AV S9 A19		
Tap a Rhythm				AV S9 A19		
Body Moving in Time to Music	AV S1 A9			AV S9 A19		
Clap or Move at the Right Time	AV S1 A5			AV S9 A5		
Processing Speed						

Volitional Rehearsal						
Pleasure/Smiling/ Motivation	AV S1 A4			AV S9 A34		
Motor Skills – Copying Action	AV S1 A7			AV S9 A19		
Co-ordination						
Balance	AV S1 A7			AV S9 A34		
Engagement	AV S1 A7			AV S9 A22		
Left and Right				AV S9 A12		
Colours	AV S1 A11					
Numbers	AV S1 A11					
Crossing the Midline						
Finger/Hand Sucking						
Confident/Comfortable	AV S1 A8					

Cognition

She sat quietly waiting and looking at the P for instructions (S1 A1; S1 A3; S1 A6; S1 A9).

She tended to wait for verbal instruction and not just copy actions. AV S1 A6, she missed the verbal instruction to hold out her hands so didn't do it.

She knew her age and volunteered the information when the group counted the numbers on the wall.

She remembered the melody and lyrics to a song and sang it in S1. In S9 she interposed '*Symbols*' when cued by the P. She understood H to be part of the group and turned him to face the P and waved his arm in A1. The girl next to her said she was six, 'AV said, '*You're four'*. The P demonstrated A5 and she clapped H's hands at the right time thrice as demonstrated.

Language

She was quiet but not shy and enthusiastically responded '*moo*' in S1 A6, also '*waa*' for a baby and '*mmm*' for a mouse.

She held hands as instructed in S1 A2.

She sang A10 in S1 as she knew the song. She nodded when asked if she knew it and was listening and smiling. She also did the actions.

In S9 A5 the P asked what the children wanted between two choices. She said her choice but so quietly no-one heard. When only one other person made the same choice, she changed her choice and put up her hand to vote with the majority.

Phonological Awareness

She chose to tap out syllables to 'Batgirl'. The P modelled it first. She said it very quietly and so the P asked her to repeat it. She tapped the syllables correctly. She then said and tapped out 'alligator' correctly.

Motor Skills

She performed the actions in S1 A7. She shuffled along like a mouse, rather than tiptoe; she couldn't tiptoe very well, as she was wearing large, fluffy boots, but she was well balanced and took big steps for a giant. She bent her knees for stamping. She performed all the actions with H in S9 A5, bending his hands for open and shut.

Timing

Her body rocked side to side in time to the music in S1 A9. She was not able to keep up A5 in S1 initially, but she kept looking and listening and open and shut her hands and put them on her lap when the song was repeated. In S9 A5 she had Humpty and clapped his hands at the right time and did all the actions.

In S9 A19 she missed the first and last beats but otherwise kept the beat of the song and beat in time. In A20 she tapped the beat to 'tap your sticks, tap your sticks' (4 beats), then the rhythm to 'everybody tap your sticks (7). She moved her body to the beat for 'la, la' but not her sticks.

Knowledge

She recognised and named the number one, when the P pointed to it. She then said, '*I'm four'*. She was correct.

She looked at the coloured fish and chose a purple one as asked. She was asked how many red fish there were, she correctly replied '*one*'.

She knew her left and right hands and offered them appropriately as requested.

Engagement

In S1 A4 she was holding Humpty's hand, maybe this made her smile. She smiled as their arms went up in the air and continued to smile all through the song.

Conclusions/Other Observations

In S1 A7 she moved close to the other children and did not look for her own space. She was present at thirteen out of twenty-four sessions. There were no apparent red flags, she knew numbers, colours and left and right, she was able to interpose missing words and clap in time to claps in a song and to keep a beat. She engaged well with the activities.

Figure 16.

Participant AL Literacy Profile

Early Literacy Skill Development Knowledge and Skills and Contributory Factors to Literacy Learning						
Sessions	1 ABS	2	7 ABS	9 Late	16	22 ABS
Skills						
RAN						
Memory					AL S16 A14	
Comprehension						
Sequencing and Prediction		AL S2 A14			AL S16 A5	
Attention and Focus		AL S2 A5				

Language Comprehension – Listening and following instructions		AL S2 A11			AL S16 A7	
Language Production		AL S2 A8			AL S16 A50	
Prosody						
Syllables		AL S2 A27				
Rhymes						
Phonemes						
Keep Time – sing or rhyme in time		AL S2 A5				
Tap a Beat					AL S16 A19	
Tap a Rhythm						
Body Moving in Time to Music						
Clap or Move at the Right Time		AL S2 A14		AL S9 A17	AL S16 A5	
Processing Speed						
Volitional Rehearsal						
Pleasure/Smiling/ Motivation		AL S2 A5		AL S9 A15		
Motor Skills – Copying Action					AL S16 A7	
Co-ordination						
Balance						
Engagement						
Left and Right		AL S2 A12				
Colours		AL S2 A11				
Numbers						
Crossing the Midline						
Finger/Hand Sucking						
Confident/Comfortable						

Cognition

She paid attention to what was going on but didn't always choose to engage in the activity. Although in S2 she participated fully in A12, she didn't perform the song at all in S16.

In S2 she was watched the P intently and held up her hands ready for the rhyme (A14). In S 16 the P asked her '*Five fat peas in a what?*' She responded, '*pea pod pressed'*. She didn't perform the actions to the rhyme.
She was listening when she looked as though she wasn't. In A28 she tied and untied her shoelaces but put her hands to her throat when the song had, 'bubbles in his throat'.

In S16 A50 she held her triangle by the string, but it was secured on a bar, not the corner. She moved the string to the corner (good thinking). She played it while the P was speaking. The P asked her to stop and she did.

Language

In S2 A6 she was possibly interposing the sounds at the end of the verses [inconclusive from the video]. In A8 she did not verbalise but did the actions.
When the song finished in S16 A15, she asked, '*Can I be the conductor?*' This was a new word to her vocabulary learned from this song [it is not often used today so it is reasonable to suggest that she learned this word in this program – or possibly 'Wheels on the Bus']. None of the children said they knew the word when they were first asked.

In S16 she asked, '*Can I have a triangle?*' The P replied, '*Wait a minute*.' She repeated, '*I want a triangle*.'

Phonological Awareness

The first time (S2 A27) she hit the drum once for ‘Batgirl’. The P repeated the word and modelled the beats with her hand. AL did it again correctly. She hit the drum three times for ‘alligator’ and no beat for ‘tor’ as she said it at the end. The P said, ‘*Oh you missed one’*. She did it again correctly.

Motor Skills

She was able to fluently change her gait, walk on tiptoe, stamp, take long strides and walk slowly with small steps.

She was able to tie her shoelaces in a double bow (S16 A28) demonstrating good fine motor skills. This was not A28 although she was listening as she put her hand to her throat at ‘bubbles in his throat’.

Timing

She was able to tap in time to a beat S16 A19 and separated her sticks on ‘stop’.

In S16 A 38 she played the triangle, but not in time.

Knowledge

She picked up green and orange fish when asked S2 A11.

She knew left and right and consistently demonstrated this correctly.

She knew the day was Thursday on S16.

Engagement

Although she engaged well in her first session, S2, she did not engage particularly well in sessions 9 and 16. She appeared a little sullen. In S16 particularly she didn't perform actions in A14, A20, A23 or A30.

Conclusions/Other Observations

Her reluctance to engage with activities, particularly S16 masked her abilities. She only attended twelve of the twenty-four sessions. However, from the sessions observed, it was apparent that she possessed many of the skills required for literacy competence. Red flags were inability to tap syllables independently and reluctance to engage with the activities. This may have been due to lack of practise and could have been overcome. There was insufficient evidence to decide her ability in timing.

4.3.4.2 Competencies Not Able to be Assessed

RAN could not be observed as other than E's demonstration of fluently in reciting numbers there was no other activity to demonstrate this.

Rhyming was not tested, only E's unsolicited vocalisation of '*cheesey wheesey'* was evidence of participant awareness of rhyming. Participants were able to offer rhyming words but were not evidenced specifically by use of the word 'rhyming'.

Phonemic awareness of the participants was not evident in the chosen videos. However, there was evidence that the P was able to demonstrate initial letter sounds in words as she did so in S9 A12, when explaining the concept of 'left'. She told the participants, ''l' for left, 'l' for LE and 'l' for L.' As part of the program, an alphabet book was used and initial letter sounds discussed and a song sung about the letter sounds. It should also be noted that awareness of rhyming endings also highlights the initial sounds in words. For example, participant E in her play with the words 'cheesey wheesey' changed the initial phonemes in the words in order to form the matching rhyming words.

Engagement was not completed for participants who had a varied levels of engagement as any activity could have been chosen for each session and would therefore not accurately reflect overall engagement. Where participants showed consistent levels of engagement with activities across a session then this was indicated.

4.3.5 Step Five – Notable Good Practice of the Presenter and Areas for Improvement

There were many aspects of the presentation of the program which were notable as good practice.

- Each activity was introduced to alert the participants to the forthcoming expectations of lyrics and actions, offering mental preparation time
- In addition to a verbal introduction, each musical accompaniment had an introductory section to help attune participants to the tempo and rhythm of the forthcoming melody
- The presenter supported her verbal instructions with physical actions and gestures to assist comprehension
- In some activities the presenter went though the lyrics and actions first, encouraging the participants to join in as a practise
- Once the participants were used to the activities she ceased to give introductions
- The presenter was able to link activities for example, A27 and A28 ‘alligator’.
- The presenter maintained the same introductory and ending activities at every session for consistency and to aid prediction of beginning and ending of the sessions
- The presenter regularly used the strategy of oral cloze to stimulate memory, thinking and speech production
- Activities were repeated regularly to embed familiarity and to reinforce learning

- The presenter sometimes offered choices to the participants between two options of activities to promote the ability to compare and contrast their preferences and offer some control over the program. She offered them a free choice of words to syllabify, with suggestions.
- The presenter modelled what she wanted to see and hear
- The presenter posed questions as a form of assessment of memory and reflection
- The presenter listened to children's questions and answers and gave them time to finish speaking
- The presenter praised the participants when they answered questions or performed a skill well
- The presenter scaffolded when children were unable to complete a task unaided, until they could do it independently – especially with regard to syllabification
- The presenter acknowledged the adult participant or participants and included them in the sessions (teacher and/or teaching assistant).
- The presenter was able to differentiate where possible for different levels of ability; for example, for Participant E in A27 Syllables, whilst other participants tapped syllables to words of their choice, the P asked E to generate some words with three, four and five syllables, necessitating the additional skill of internally counting the number of syllables and matching these to words in her vocabulary on a given topic, in this case animals.

There are some areas in which the presenter could have improved:

- On some occasions the presenter started an activity without an introduction. This resulted in the participants not being ready and unable to join in at the beginning of the activity.
- Whether the participants should move in time to a beat or a rhythm was sometimes unclear. Although the presenter modelled what was required, she did not explain it ahead of the activities.
- On some occasions the presenter did not see or hear a participant speaking so did not respond. This only become apparent from watching the videos.
- The musical accompaniment was not always cued in time and participants had to wait.

4.3.6 Step Six – Activity Assessment

Another question arising from the literature review was to determine which activities were the most effective in achieving literacy outcomes. In order to address this question, the participant profiles offer a guide. The profiles offer only one example for each skill area but give an indication of which activities are referred to most, in terms of skill demonstration. Comparison of the number of times each skill is cited reveals that six activities had over twenty citations, indicating the ability of the activities to evidence performance of foundational literacy skills.

Figure 17.

Frequency of Citing of Skill Demonstration by Activity

Frequency of Citing of Skill Demonstration by Activity	
Activity	Frequency Cited
A1 Welcome Song	**29**
A2 Time to Sing Hello	7
A3 Hello Names	17
A4 Up and Down	14
A5 Open Shut Them	**47**
A6 If You See a Puddle	**23**
A7 Can You Walk on Tiptoe	16
A8 Calm, Rough, Stormy Sea	12
A9 Going Fishing in the Sea	12
A10 One, Two, Three, Four, Five	7
A11 There Are So Many Fish	13
A12 Left Hand, Right Hand	**29**
A13 Five Fat Peas	3
A14 Alley O	10
A15 Bus Song	10
A16 Marching to the Drum	2
A17 Five Fat Sausages	2
A18 Build a Brick	7
A19 Tap and Tap Together	15
A20 Tap Your Bricks	10
A21 Tap Your Sticks in the Air	**26**
A22 As I Was Walking Down the Street	4
A23 Cobbler Cobbler	3
A24 Tap Quiet, Loud, Fast, Slow	1
A25 I Went to Visit a Farm	3
A26 Aeroplanes	7
A27 Syllables	**22**
A28 Turtle	8
A29 I’m a Little Humpty	2
A30 Hickory Dickory Dock	5
A31 Happy and You Know It	N/A
A32 Humpty Dumpty	N/A
A33 Hurry Hurry	N/A
A34 Okey Cokey	4
A35 My Cat Ben	11
A36 Phonemic Awareness	N/A
A37 I Hear Thunder	3
A38 Twinkle Twinkle	0
A39 I am Humpty Dumpty	2
A40 My Hat	N/A
A41 Granny’s House	N/A
A42 Mousey Brown	5

A43 Round and Round the Garden	0
A44 Mouse in a Hole	3
A45 Mouse Mouse in Your House	1
A46 Rover	3
A47 Owl Story	N/A
A48 Goodbye Names	1
A49 Goodbye All	3
A50 Instruments	1

An additional method, for the purpose of multiple methods for accuracy, was the application of inductive coding of the data to search for evidence of skill demonstration in each activity across the sessions. Each activity was analysed to identify further evidence of skill competence and knowledge. This revealed not an identical set of activities but some of the same.

Figure 18.

Activities with the Highest Foundational Literacy Skill Performance

Activities with the Highest Foundational Literacy Skill Performance and Knowledge	
	Activity Numbers
High frequency of citing (over 20 times)	1, **5, 6**, 12, **21, 27**
Identification of high impact through inductive coding	3, **5, 6**, 8, 15, 19, **21**, 26, **27**, 28, 35, 42, 50

The activities identified through high citation and inductive coding were, 5, 6, 21 and 27. These are discussed first. A5 Open Shut Them was extremely popular and attracted a high level of engagement. It was successful in focussing participants' attention, embedding memory of vocabulary, sequence and actions, demonstrating language comprehension (following the instructions), promoting language production (participants singing), inducing movement (performance of fine motor skills); it included oppositional adjectives (open and shut), rhyming (clap, lap; chin,

in) and timing of the lyrics to the melody and the actions to the beat and the lyrics. It therefore promoted a wide range of foundational literacy skills and engaged the participants through ease of enactment, humour and repetition as the song was always repeated due to its short length and enjoyment. It was easy to remember and perform and all participants were able to sing it and perform the actions. It was requested by participants, and it made them laugh.

A6 If You See a Puddle involved response to visual stimuli, response to verbal instructions in the song, vocalisation on cue, locomotion, gross and fine motor skill performance on cue, vocabulary extension, integration of language and movement in time to music, focus and attention to the book and verbal and visual cues, following instructions, sequencing, comprehension and memory. Participants danced to a long introduction in preparation for the activity, inducing anticipation and memory recall. The melody was catchy and motoric; all participants 'jiggled' to the music. The song had six verses so allowed for repetition with each verse introducing a different visual for response.

A21 Tap Your Sticks in the Air involved object control in the form of two claves. Participants were encouraged to tap the claves together in time to 'one, two, three' in the song in different places which they could choose after the initial choice of the presenter. All participants were to tap the same place at the same time. Actions included crossing the midline, tapping behind the body, on the body and above and to the sides of the body. Although all participants joined in, they were not particularly successful in tapping in time.

Whilst other activities involved movement to syllables in the form of rhythm in melody and lyrics, A27 Syllables was the only activity to focus only on the skill of syllabification. Participants requested this activity. They enjoyed striking the drum with the big beater and having their own choice of words to beat out. The P offered topic suggestions such as ‘superheroes’, ‘favourite foods’ or ‘animals.’ ‘Superhero names’ was the most popular topic and stimulated conversation about films the participants had seen. It was possible for the P to differentiate this activity, for example, she asked one participant to suggest words of a different topic ‘animals’ with three, four and five syllables. This necessitated the ability to syllabify and count internally the number of syllables in a word.

Deeper investigation of these activities through closer examination of the data revealed that A1 Welcome All to Sounds and Symbols, being the first activity in each session was effective in promoting memory retention of the name of the sessions, as the name was repeated four times in the song, and it was performed at every session. This activity gave focus to the sessions and signalled the beginning of the session. It was also repeated at the end in the form of ‘Goodbye All from Sounds and Symbols’ and signalled the end of the session. It offered a sense of sequence and enabled participants to know what was to follow. The participants waved throughout the song, integrating movement and language, and were able to quickly learn the repetitive lyrics which enabled them to join in and created a sense of unity and success.

A3 Hello Names was a short and simple introductory song which was performed at the beginning (and end as ‘Goodbye Names) of each session. By the end of the program the participants were singing and waving. They sometimes sang their own name or that of someone else. Some participants smiled when their name was sung.

A8 Calm, Rough, Stormy Sea was received with excitement as a parachute was introduced. The participants took great delight in holding and moving the parachute. The participants were told that the parachute was ‘sea’ and activities followed with a sea theme with plastic fish added too. The purpose of this was to stimulate imagination and recognise the use of physical metaphor.

A12 Left Hand Right Hand was most cited as promoting knowledge of left and right (also Okey Cokey) as this was the purpose of the activity. It also promoted a sense of beat as it required moving each arm in time to the beat of the music. It combined the beat, movement and language together to reinforce left or right. The movement of the left hand coincided with the recitation of ‘left hand’ and vice versa with the right hand. The song also involved clapping to a beat. Some participants showed improvement in knowledge of left and right after this activity.

A15, Bus was popular. Participants stood or sat at imaginary bus stops and waited for their name be sung before ‘boarding’ the imaginary bus. A driver was assigned each time who was to ‘drive’ the passengers to their destination. When there were enough participants, a conductor was also assigned to sit at the back of the bus to

create a ‘seating area’ on the bus. The main skill required was listening for their name and responding. No participants were observed to be singing and none joined in the ending ‘bump’ despite the P’s encouragement to do so. This activity however, was often requested and also participants wanted to repeat it a second time. It maybe appealed to their imaginations, and they seemed to like the theme of ‘transport’ as they also enjoyed the ‘Aeroplanes’ activity.

In A19, Tap and Tap Together, the participants were required to tap claves in time to the beat. The instructions were very simple, to tap and to stop in time to the music and lyrics. The song was very short. It was successful in helping participants to focus on the music and lyrics and to tap in time to the beat.

A26, Aeroplanes was very popular as it involved laying still on the floor and then in response to the lyrics, ‘flying’ around the room. The activity promoted listening skills, focus and attention, language comprehension and vocalisation (although participants were busy listening to the cue to move and tended not to sing until the final word ‘high’). It also promoted locomotion, spatial awareness, and the following of instructions on cue.

Activity A28, Turtle was similar to A5 in that it told a story, but A28 was longer than A5. The music had a strong beat with some participants unconsciously moved to. It had actions to complement verbs – simple verbs - ‘swim’, ‘drank’, ‘ate’ and phrasal verbs -‘come in’, ‘go out’, integrating language and movement. There was a prop (picture of a turtle), which participants asked to hold. One participant imagined

‘bubbles in his throat’ (maybe the scales) on the picture as per the lyrics and showed them to the P. The song had rhyme (Tim, swim; soap, throat; nurse, purse) and alliteration – turtle, Tiny Tim and promoted syllabification of ‘al-li-ga-tor’ by the elongating of the pronunciation of the word and slowing down of the melody. It had repetition in that the doctor, nurse and the lady with the alligator purse came in and then went out. The listeners were left to decide if the turtle was saved by the visitors. The P linked this activity to A27 using ‘alligator’ as a word to syllabify. This activity seemed to pique the participant’s imagination and it was one of the activities which was requested.

Activity 35, My Cat Ben was a musical story in a book and therefore had accompanying visuals as well as written lyrics. The story had six verses and a chorus and was humorous. It was sung to the familiar melody of ‘This Old Man, He Played One.’ The participants were soon able to remember the sequence of the verses and to offer information about the cat prior to the start of the song. They were able to describe him as ‘greedy’ and ‘naughty’ and one boy noticed that he was wearing a blue collar. His colour was initially described as ‘orange’ but the P was able to introduce that his colour might also be described as ‘marmalade’ or ‘tabby’. Thus, the activity promoted memory recall, sequence, attention and focus, language comprehension, language production, vocabulary extension, beat in the verses, rhythm in the chorus (participants were asked to clap along), awareness of rhyme (day, play; treat, eat; mouse, house; belly, jelly; leg, instead; horse, course’ train, again) and timing – the P used the strategy of cloze for participants to interpose the second rhyming words in each verse and in the chorus. There was

also a pause in the music for participants to interpose the word ‘yeuch’ after the lyrics conveyed a feeling of disgust with the cat’s behaviour. This induced either smiling in the participants or a screwed-up face of revulsion.

A42, Mousey Brown is a rhyming story about a mouse who gets stuck at the top of a candlestick, with accompanying actions. Participants are encouraged to join in the with recitation of the verse, performance of the actions and the shouting of ‘Grandma, Grandma’ when the mouse gets stuck at the top of the candlestick. The participants were given grey, felt, finger mice to help them to enact the story. The activity was successful in promoting focus and attention, memory, prediction, language comprehension, language production, fine motor skills and timing.

A50, Instruments was itemised as a separate activity in which the P gave out the instruments and introduced them by name and demonstrated how to use them. It offered the opportunity for the participants to learn the names of the instruments, their use and the materials they were made of. Participants were also asked to practise playing their instruments according to specified dynamics and tempo. The activity promoted language extension and production, memory, co-ordination and ability to adjust motor movements to produce a desired sound effect.

Further analysis of the data indicated recurrence of themes through the activities. Inductive coding was therefore used to identify descriptors which occurred frequently, and which indicated a high level of engagement and popularity of the activities. The codes identified were, performance of actions, vocalisation/joining in

with song and rhymes, smiling, requests for a specific activity to be repeated or performed, and requests for props – Humpty, mice, books, large drum or instruments. This revealed the most popular activities to be numbers 5, 6, 26, 27, 28, 35, 42 and 50. Comparison against the activities which promoted the most foundational literacy skills and knowledge indicated that enjoyment of the activities appeared to induce increased engagement; this enabled evidence of literacy skill development to be observed.

Figure 19.

Comparison of Literacy Skill Demonstration with Enjoyment and Engagement

Comparison of literacy skill demonstration with enjoyment and engagement	
	Activity Numbers
High frequency of citing (over 20 times)	1, 5, 6, 12, 21, 27
Identification of high impact through inductive coding	3, 5, 6, 8, 15, 19, 21, 26, 27, 28, 35, 42, 50
Identification of enjoyment	5, 6, 26, 27, 28, 35, 42, 50

The most popular activities had in common that participants were easily able to join in. Activities 5 and 26 had no props. Activity 5 consisted of simple actions which were repeated, the song was short and therefore always repeated twice, and the song ended with the children laughing. Activity 26 involved the participants needing to listen carefully to the lyrics and to respond by making aeroplane sounds, ‘flying’ and ‘landing’ in their roles as aeroplanes. Activities 6, 28 and 35 involved visual props. Activity 6 involved physical responses to the visuals presented, activity 28 was a song which related the story of a turtle in a bath and activity 35 involved a book, which related a story about a greedy cat, and which had six verses and a chorus about his mischievous adventures, which were sung. The participants were

asked questions individually and as a group about the story. These activities also involved humour. Activity 42 was a story about a mouse, which the participants had to move their finger mouse puppet to and shout at one point. They enjoyed very much the change in dynamics and all shouted with gusto. In activity 27 the participants took turns to beat out syllables on a large drum; some enjoyed beating the drum very hard, they could also choose their word or words to beat out. Activity 50 involved the playing of a variety of percussion instruments. The participants sometimes got to choose their instruments and they were able to change them.

The data presented in Chapter Four with regard to the acquisition of foundational literacy skills of the participants, the method and manner of the program presentation and the opportunities for skill and knowledge promotion within the activities, facilitated the ability of the researcher to begin to answer the research questions. Further analysis and discussion in respect of the data presented and answers to the questions are furnished in Chapter Five.

CHAPTER FIVE – SUMMARY AND INTERPRETATION OF THE FINDINGS

5.1 Program Outcomes, Design and Delivery

5.1.1 Differences in Outcomes between a Musical Program and a Literacy-through-Music Program

Firstly, the findings elucidate how an integrated literacy-through-music program differs from a music program in its purpose and outcomes, then how the design and delivery differ from conventional music or literacy programs and explanation of how this difference could account for the effectiveness of the program.

In contrast to a music program, a literacy-through-music program has literacy outcomes as its goal. It differs from a music program as a music program has musical outcomes such as ability to discern pitch, keep a musical rhythm and produce a melody; whereas a literacy program would, for example, promote language and phonological awareness, the matching or generation of rhymes, segmentation of syllables into individual phonemes and the matching of phonemes to graphemes. This is illustrated in the following table:

Figure 20.

Differences in Outcomes between Music and Literacy Programs

Differences in outcomes between music and literacy programs	
Music	**Literacy**
Naming musical notes on a score Discernment and production of pitch changes Recognition of musical timbre Observation of and ability to vary the duration of musical notes Ability to detect and perform changes in dynamics Melody imitation Singing phrases and songs Rhythm imitation Tempo discrimination Musical meter, beat perception and imitation Synchronisation to a melody Learning how to make sounds on an instrument	Recognition of alphabet letters, naming letters and matching to sounds Correct letter formation Sound to symbol correspondence Initial letter sounds and visual representation – A - apple Concepts of print Syllables Rhymes Cognitive outcomes – memory, RAN, comprehension, attention and focus, sequencing and prediction Language outcomes – listening/language comprehension/following instructions Awareness of prosody, grammar and vocabulary Vocalisation Phonological awareness – Syllabification Awareness of rhyme – match and generate rhymes Phonemic awareness Gross and fine motor skills Balance, co-ordination

From this table is clear to see, as Butzlaff (2000) concluded, how teaching elements of music does not teach literacy, most obviously because the learning outcomes are different.

The integrated literacy-through-music program designed for this research had literacy outcomes and was delivered through musical activities which integrated music, language and movement, as illustrated in the table below:

Figure 21.

Musical Activities and Literacy Outcomes in the Integrated Literacy-through-music Program

Musical activities and literacy outcomes in the integrated literacy-through-music program		
Musical Activities	**Cognitive, Language and Motor Skills, and Knowledge to Promote Literacy Outcomes**	**Integration of Skills**
Singing	Fluent production of language Practise of language production Memory Correct pronunciation of words Build vocabulary Increase language comprehension Promote awareness of rhythm	Listening and attention Auditory memory of melody and lyrics Language production, fluent, correct and in time to musical melody
Singing of rhymes	Promotion of rhyme awareness Match and generate rhyming words	Listening and attention Auditory memory retention and recall Language production
Action songs and rhymes	Promotion of motor skills/gesture to support language production Gross motor – balance, co-ordination, timing	Verbal and non-verbal communication Language and movement Music and movement Language, movement and music Music, movement, Language and timing
Alliterative rhymes	Phonemic awareness Rhythm	Phonemic awareness Movement

	Timing Memory	Timing Memory
Musical stories	Sequence and prediction, Memory Language comprehension and production + vocab	Listening and attention Sequence and prediction Memory and Language
Songs and rhymes with props (eg mice) Presentation of books	Language Prosody Fine motor skills Phonological awareness Concepts of print Response to visual stimuli	Language, movement, music, fine motor skills and phonological awareness Integration of sight, sound, music and movement
Beating syllables on a drum	Segmentation of words into syllables	Language, movement and phonological awareness

Note: Whilst one or two skills are identified in the table as being integrated in an activity, it should be noted that most activities would promote a range of skills, each of which could be particularly strengthened by focus from the presenter as required.

It should also be noted that to achieve the literacy outcomes, musical elements are generally matched and integrated with language and movement and the presenter or teacher must emphasise the skills which will support literacy learning. For example, below is an explanation of how musical elements - included to promote discrimination of sounds - were matched with language and movement in order to draw children's attention to variations in sounds in both musical melody and language, reinforced by movement in various activities:

Pitch – A29, 'I'm a Little Humpty' – the presenter matched the pitch of the melody with the language 'high' and with the movement, stretching arms to the sky.

Dynamics - A37, ‘I Hear Thunder’ – the presenter introduced the song and asked if thunder would make a loud or a quiet sound, demonstrated both and invited the participants to practise making loud and quiet sounds. The song lyrics (I hear thunder) were matched with the participants making loud sounds with their instruments, integrating physical co-ordination, application of pressure and appreciation of personal space with listening to and synchronisation in time with the musical melody and song lyrics and language and melody production.

Tempo A37, ‘I Hear Thunder’ – as per for dynamics, matching language to movement and speed of playing the instrument at ‘hurry up the sunshine’.

Duration – A28, ‘Turtle’ - purposeful elongation and amplification of the duration of the word ‘al-li-ga-tor’ to explicitly demonstrate the syllables in the word ‘alligator’. In this instance there was no physical action for the word ‘alligator’. There was a ‘turtle’ visual, and actions to the song. In an activity to practise the physical beating of syllables with the sound out of them, the word ‘al-li-ga-tor’ was used, to link these two activities, to instigate memory recall and in congruence with Bruner’s Spiral Curriculum.

Prosody – A42, Mousey Brown – participants were invited to recite the words to the rhyme. The presenter used a sad tone and shook her head (reinforcing language with gesture) when reciting, ‘*but she couldn’t get down’* and then encouraged the participants to shout ‘*Grandma, Grandma’* in very loud voices. This draws attention to the changes of intonation and stress in language production to

result in a particular effect. This activity does not have musical accompaniment and children's songs, due to their uplifting nature and ability to elicit emotion, tend not to be in minor (sad) keys. An example of a children's song in a minor key is 'Rain, Rain Go Away'; this serves to reinforce the feelings evoked by the falling rain and its implications of not being able to go out to play. It is also sung slowly, reflecting the glumness of the situation. Music, like actions can be used to support language comprehension in this way.

Prosody consists of both intonation (recognising for example a happy or sad tone) and stress (a longer, louder and/or higher, therefore stronger, sound). The pattern of the stresses in both music and language is termed 'meter'.

Meter – Drawing attention to strong and weak beats (the meter) in music, helps children to synchronise their movements in time to it and also increases awareness of this meter. For example, the songs, 'Happy Birthday to You' and 'My Bonnie Lies Over the Ocean, are in triple meter; there is stress on the first of each set of three beats. The songs in the program used in this research were in duple meter. By way of example, the song, 'Twinkle Twinkle Little Star' (A38) has both musical stress and language stress on the first syllable, the music helps to accent this stress for the listener. To further consolidate the stress, the presenter demonstrated, and the participants were encouraged to play their instruments in time to the rhythm, hitting their instrument on the stressed syllable. The ability to identify stressed syllables in words facilitates language comprehension and production and reading fluency.

Heteronyms, such as ‘present,’ ‘bow’ and ‘lead,’ for example have differing meanings depending upon which syllable stress is placed.

In 2013, Goswami et al. found impaired perception of syllable stress in children with dyslexia, along with difficulty with discerning other phonological units of syllable and rime. She called the tasks of determining on which syllable stress lay ‘dee dee’ tasks; children had to match familiar character names, such as Harry Potter, to stressed and unstressed synthesised sounds. Inability to attend to stresses in words can be indicative of problems with literacy learning and early identification may help to implement the help required as early as possible.

Rhythm – Rhythm is how the sounds in music or language are organised in time. Patel (2003) explains that music and language have similarity in that they have combinations of words or notes which can be grouped into phrases and that they differ, in terms of rhythm, as language does not have periodicity (recurring intervals of time), whereas music has a recurring beat. Spoken language does not induce a beat in the same way that music does. A20, ‘Tap Your Bricks’ used syllabic music; thus, the rhythm in the music matched the language syllables and participants synchronised their movements of tapping claves, to both the music and the language, integrating and reinforcing the segmentation of language sounds (syllables). This necessitated listening to the rhythm and lyrics and co-ordination of the body.

Timbre – Timbre refers to the perceived quality of a sound. It is another way to draw children's attention to variations in sound. In activity 50 for example, the presenter asked the participants to make sounds individually with instruments made from metal, wood and plastic and compare their sounds. This was also an opportunity to discuss the different materials that the instruments were made of, linking the music making with vocabulary and science. Various sounds could also be made by using the instruments differently; for example, the caterpillar guiro could be struck, scraped or shaken which produced different sounds and participants were able to compare and contrast the sounds. The participants were required to engage fine motor skills and play in time and at the right time as per the lyrics and music in the activities.

5.1.2 The Program Design

The activities presented were musical in nature and were similar to those which might be observed in any early childcare music session. The learning outcomes however, were not musical but explicitly targeted the foundational literacy outcomes identified in the literature review. This was achieved through careful selection of activities which would be suitable for the purpose and through the focus of delivery. Activities were chosen which would facilitate the promotion of the skills required, for example, beating out syllables on a drum promoted syllabic awareness, songs with verses promoted sequencing skills and memory recall and the presenter would promote these skills by asking the participants to recall the order of the verses for example; rhymes promoted awareness of rhyming sound patterns and the

presenter used cloze to focus the participants' attention on the rhyming words; and activities involving movement to music and in response to lyrics, promoted language comprehension and gross motor skill development. Most activities promoted a variety of skills which were further highlighted by the presenter specifically drawing the participants' attention to them. Six sample programs were devised which varied slightly from week to week to extend the acquisition of skills and knowledge. The programs delivered were adjusted each day to accommodate needs and preferences as required. For example, if an activity failed to add any value or its usefulness had expired, for example A4 after week one, (it was introductory and simple; the participants were able to perform it and it presented no further challenge or learning opportunity) then it was removed from the program. If the participants expressed a desire to perform a specific activity, then this was generally granted, time permitting. This gave the participants some agency and added to their enjoyment. The program was designed to be pleasurable and to create an environment which was conducive to learning. Although the literacy skills were explicitly taught, they were embedded in the musical activities and not delivered as drill. Repetition within music promotes practise which is pleasurable.

The overall program was deemed to be suitable for the age, stage and context of the participants. The content consisted of songs, rhymes, musical stories and musical activities to encourage the participants to attend to and produce changes in sounds, both in music (with and without instruments) and in language. It targeted cognitive, language and motor skills and particularly timing, by encouraging participants to entrain to a beat or rhythm, matching both language and music

sounds to movement by the use of syllabic music and the modelling of behaviour and actions by the presenter. As the participants engaged well with the activities and enjoyed them, this evidenced that they were of a suitable level and context for the target group.

5.1.3 The Program Delivery

The program was delivered in thirty-to-forty-minute sessions over six weeks, through twenty-four sessions. The timing of the sessions worked well, participants did not get bored, evidenced by their active participation and requests for more activities, but the time allocated allowed for a varied range of activities to be undertaken. The overall duration of six weeks allowed the researcher to determine that skills were being developed but a longer period would have allowed the researcher to have more definite results rather than relying on extrapolation. Some activities were not undertaken for long enough for all participants to show improvement or proficiency in a skill, for example learning the concept of left and right or being able to tap a regular beat in time with a melody. Whilst some participants showed competency, others showed partial competency (not regularly) and others barely. If the activities had longer duration, then this would have allowed a longer period in which the participants could have developed the skills. If the researcher had focussed on fewer skills, then this may also have shown a more positive effect on learning outcomes of these skills. However, the breadth of skills covered enabled the researcher to evaluate how participants integrated and applied all the foundational literacy skills, which was a particular aim of the study, as other

research has focussed on the development of single literacy skills through musical activities to determine correlation.

The delivery of the program by the presenter was evaluated and the results presented in Chapter Four. There were many elements of good practice demonstrated, including the use of musical and verbal introductions, use of gesture to support language, use of oral cloze to instigate language production and often rhyming words, modelling of expected behaviour, scaffolding and differentiation; she also offered options to the participants to give them a sense of agency and she praised them regularly for their responses. If an activity was started without an introduction, then the participants were unable to join in when required. This highlighted the importance of preparing participants for the start of an activity and the value of using music which generally consists of an introduction. This musical introduction also set the pace and rhythm of the forthcoming song. It also offered the opportunity for the presenter to teach the word ‘introduction’ to the participants and to draw their attention to it and enable them to listen and prepare themselves. The presenter sometimes failed to respond to a participant’s communication, which highlighted possible missed opportunities for learning. She was sometimes faced away from the participants or speaking with one when another wanted attention. These are general issues faced by a teacher. The presenter could have been clearer in her instruction of how to respond to a beat or a rhythm. She allowed the participants to respond as best suited them, this may either have been confusing or may have helped them to find their own best way to learn and in their own time.

With reference to figures 20 and 21 the presentation of activities may also differ between promoting musical and literacy outcomes. The presenter in this program focussed on the promotion of literacy skills. She took care to listen to what the participants said and echoed their intended vocalisations for clarity and to confirm to the participants that she was listening to and valued their input. The echoing of a child's vocalisation with corrected grammar or pronunciation can help them as they hear the correct pronunciation being modelled. In this particular case, the presenter had an English accent, whilst the participants had Scottish accents; repetition therefore aided comprehension for both the presenter and participants. According to Cychosz et al., (2023:197) children must learn to disassociate variable word productions from novel word productions in order to map novel words onto new referents in the environment and to build vocabulary. Listening to various accents therefore helps children to attune their listening skills and to cement their vocabulary.

An example of a participant in the study being able to do this was participant L who was able to comprehend the word 'said' when pronounced 'sed,' by others, but himself said 'sayed'. The presenter also strove to build vocabulary of the participants with 'conductor,' 'introduction,' 'semi-circle,' 'octachime' and 'guiro,' being possible new additions to the vocabulary of the participants. The word 'splash' may also have been a new onomatopoeic word for the participants as they generated the word 'jump' in response to a visual of a child jumping/splashing in a puddle. The presenter repeated this word in another activity, reinforced by the 'splashing' of hands into imaginary water. Participants were encouraged to vocalise

in all activities, thus promoting language comprehension and production. Actions often accompanied the lyrics in songs and rhymes, further supporting language learning and production. Furthermore, when people sing, they generally lose their accents, as matching the lyrics with melody tends to elongate the words and emphasise the sound segments. A program presenter can make beneficial use of this to heighten the awareness of phonological units.

The presenter used musical accompaniment, which was engaging for the participants, offered a cue to the beginning of the performance, evoked memory recall, and assisted fluency of performance of actions and language production. Development in fluency could be observed over time as the participants were able to sing an increasing number of words in songs, matching them to the melody. Language fluency is a determinant of reading fluency. Matching lyrics to melody entailed the integration of listening skills, close focus and attention, memory recall, fluency, sequencing and prediction, timing skills, language production skills and in the case of songs with actions, also motor skills. The conflation and simultaneous performance of these skills would stimulate both sides of the brain and subsequently have greater efficacy in promoting literacy ability than the performance of any one single skill. The ability to integrate and apply skills is required for literacy, for example, when writing a sentence, the writer must focus and pay attention to the words that will be written and their correct grammatical structure and sequence, they must possess the vocabulary to do this and knowledge of their content, they must remember how the words are spelt and formed, they must be able to map the language sounds to their symbolic

representations using the alphabetic characters and they must engage muscle memory for the letter formation and fine motor skills for the control of the writing implement. These skills must be performed simultaneously. Children therefore need practice in the integration of the skills they learn in order to apply them to literacy tasks.

The presenter promoted the acquisition of phonological awareness through slow and lengthened enunciation of syllables to assist syllabic awareness, and scaffolded the learning of children to beat out syllables on a drum whilst enunciating them; again fostering the ability to integrate language and movement. The awareness of onset and rime was promoted through repetition and recitation of rhymes and songs with rhyming lyrics. The presenter also used the strategy of cloze to encourage participants to interpose rhyming words, thus drawing attention to matching sound patterns.

Although the videos with phonemic awareness activities were not transposed, activities were provided to encourage participants to suggest whose names began with a certain sound for example, or the presentation of pictures in an alphabet book to encourage the generation of initial word sounds.

The outcomes detailed so far as being promoted by the presenter would not be foremost in a music curriculum; the focus was deliberately upon outcomes which would support literacy learning. There are areas of overlap between outcomes for a music teacher and outcomes for a literacy teacher. For example, in this program

the presenter also encouraged children to move in time to music both through locomotive and stationery actions, to manipulate objects (claves, instruments and puppet mice) which fostered the development of fine motor skills and those of timing and focus and attention. Such activities are likely to be included in a music curriculum with similar outcomes of maintaining a beat and rhythm and moving in time to music. Whilst cognitive skills, those of language comprehension, language production and motor skills would be desired outcomes of a literacy program, they could be an unintentional consequence of a music program.

The differences in program design and program delivery between a music program and a literacy-through-music program explain how a literacy-through-music program can be successful in providing a vehicle for the promotion of pre-literacy outcomes, whilst a music program must rely on transference of music skills to literacy ones for effective pre-literacy skill outcomes. The over-riding features are that music, language and movement are integrated and that there is focus upon pre-requisite literacy skills.

5.2 Participant Learning Outcomes

The results recorded in Chapter Four, enable information on the effectiveness of the program in respect of the participants acquiring the requisite outcomes, to be elicited. Evidence of the performance or not, of the literacy outcomes was extracted from the video transcriptions per session and tabulated in a literacy profile for each

participant. Examination of this data facilitates the answering of the first research question for each of the participants:

- To what extent can a literacy-through-music program be effective in the promotion of foundational literacy outcomes for children aged four years?

There were nine participants, and each brought various prior learning experiences, life experience, skills and knowledge to the sessions.

Participant E was four years and three months old and was able to demonstrate many foundational literacy skills upon commencement of the program. Evidence was clear to support the existence of these skills. She was confident and outgoing from the start. She readily answered questions posed in all sessions. She was able to express her preferences. She had a good memory and despite a high record of absence, she remembered any activities which she had participated in and in one session demonstrated the ability to sing a whole song. She had a good grasp of various concepts, colours and could count. She appeared eager to learn and was able to support others in their learning; she guided them to participate. When activities were due to begin, she demonstrated that she was ready; she looked at the presenter and for example, if the activity involved sticks, then she was holding them and waiting for the activity to begin. She was not distracted. She was able to keep a beat and tap a rhythm. It is possible that this skill was a natural one to her as she moved her body in time to the beat on the first session, unsolicited. She was able to generate vocabulary not used by anyone else (think of animals), could

remember new vocabulary (guiro, introduction) and was able to chunk given or her own words into 3, 4 and 5 syllables correctly. She could remember a melody. She listened well and was a confident and capable speaker.

In S1 A6 the P used cloze ‘If you see a puddle you have to go …?’ She responded ‘*jump*’, the P said, ‘*splash*’. When the song played, she jumped on ‘splash’ but did not verbalise ‘splash’. It is possible that the difference between the action and the word in her head and the onomatopoeic word being used, prevented her from verbalising. Subsequently, in S16 she vocalised ‘splash’ and jumped at the same time. She had absorbed it into her movement schemata and vocabulary. She also sang some of the words of the song. This demonstrated that the program was effective in affording opportunity for participant E to perform actions and vocalise simultaneously, demonstrating integration of skills pre-requisite to literacy.

In addition to the wealth of knowledge and skills that participant E brought to her literacy learning she could also recite numbers beyond ten fluently, a strong predictor of reading fluency (Koponen et al., 2013). She learned and recalled song lyrics, she understood the consequences of pulling the parachute too far and was able to focus on each activity and be ready to start as each began. She understood the concept of listening to an introduction, she added ‘guiro’ and ‘semicircle’ [possibly ‘conductor’ too] to her vocabulary and was very able at answering questions and expressing her own desires and needs. She remembered that the octachime had eight pieces. She also demonstrated her awareness of prosody, quizzically enquiring about a fishing song ‘*fishing*?’ She also supported the actions

of others and helped them to participate if required. She was able to focus on language sounds and was able to pronounce ‘introduction’, enunciating the syllables, when asked. She could syllabify, generate rhyming words and subsequently manipulate initial phonemes.

Participant E engaged well with the activities and appeared to enjoy them. There were occasions when she didn’t fully focus, this caused her to be behind in joining in, but she quickly caught up, indicating ability to process information quickly. She was well balanced and co-ordinated and possessed effective gross and fine motor skills. She was able to cross the midline when using claves to tap her shoulders, crossing over her arms. She knew numbers and colours. Although she was unsure of left and right in two sessions, she was proficient in the third.

In the first session participant E was observed to be subconsciously moving in time to the music. In S7 she was unsure of tapping the beat or the rhythm. The presenter had tapped the beat initially but tapped the rhythm for the last three words to emphasise the ending. In the other songs and subsequent sessions, she was able to tap the beat and tap the rhythm as demonstrated. She interposed words and actions at the correct time too.

Observation via video allowed the researcher to replay and to observe behaviours that might otherwise not have been noticed. On many occasions participant E could be seen to be reviewing songs or activities that had been enacted at other times and were not the focus of the current task. For example, when the claves were given out in session 7 she began singing to herself one of the songs from a previous

session and performing the actions. When a piece of music played accidentally, she began performing the actions to that song. This demonstrated her ability to memorise and recall information very quickly and apply it. This process which I have termed ‘volitional rehearsal’ will be investigated further in Chapter Six.

Another noticeable observation was that other than two occasions, she was always ready to start an activity; she was looking at the presenter and in the case of activities with claves, for example, she held them up ready to start tapping. She had also missed ten of the twenty-four sessions, which did not appear to have negatively impacted upon her performance.

With reference to Figure 2, in Chapter Two, which illustrates the factors which are present in children who are competent literacy learners, participant E possessed all the factors, which would indicate that she would not be lacking in ability to become literate. The evidence provided also illustrated how a literacy-through-music program could be used to assess children at risk of literacy struggle or failure.

Considering whether there was any benefit to participant E of being part of the program, a question similarly posed by Bhide et al, (2013) who considered whether all children would benefit from music training as their research was undertaken with children with learning difficulties, it could be observed that she had the opportunity to practise the important skills that she would require for literacy learning, language skills - extending her vocabulary, receptive and productive language and practising language production and improving her ability to keep a beat and a rhythm. She

was able to consolidate her knowledge of left and right. She was also exercising memory recall, adding to her repertoire of songs, rhymes and stories, practising language production and extending her gross and fine motor skills. In addition to the many benefits of musical participation itself, she would undoubtedly benefit from participation in the program, not least because of the simultaneous stimulation to both sides of her brain in the undertaking of many of the activities, requiring her to integrated and apply the skills she had. This conclusion was also reached by The National Early Literacy Panel (2009:222) which stated that, '*It might be expected that oral language-enhancement interventions would work better with children who struggle with language or have some form of language impairment, but these analyses suggest this not to be the case … language-enhancement interventions provide a useful support to a broad range of children, including those with normal language functioning.'*

Supporting Moritz et al.'s findings (2013) that rhythm skill was related to phonological awareness, it was apparent that participant E was able to maintain a rhythm and was able to segment words into syllables and to detect and generate rhyming words. Also confirming Moritz et al.'s findings that rhythm sensitivity, oral language and ability in phonological tasks are related Participant E was competent in all areas relating to detection of sounds within language.

The other participants did not possess the plethora of skills of participant E. Participant C for example, the youngest participant at three years and ten months, did not participate vocally hardly at all, at the beginning. He began to interpose

words when the presenter used cloze, and his engagement appeared to increase commensurate with his enjoyment of the activities and over time. Patel's OPERA hypothesis (2011) explains how music training benefits speech processing and may apply in this case. The Overlap in brain networks for the processing of music and language is stimulated by listening to and singing songs. Music makes higher demands on Precise performance than speech, which may have accounted for his initial reticence to vocalise. As participant C was enjoying the activities, as evidenced by his smiling and positive demeanour, this induced positive Emotions, most of the activities were Repetitive, which reinforces engagement of the shared networks and elicits Attention as the enjoyable nature of the activities is attention grabbing.

It was clear that Participant C was thinking about a film he had watched [Spiderman] when asked to name and then tap out the syllables of a superhero, which he did correctly. He named other characters and was keen to proffer information about the film. This indicated that the activities were pertinent to the participants and their ability to link their experience to the activities was motivational. The interjections of participant C indicated that he was paying attention to the activities and learning lyrics. His engagement with the actions also increased over the duration of the sessions. Like participant E, he was also observed to be moving his body in time to the beat of the music in session one, session sixteen and session twenty-two. In session seven he tapped in time to the musical rhythm, whilst the presenter tapped to the beat. He was internalising the music himself and not copying the actions of the presenter. This behaviour was contrary to initial observations of participants

copying actions over following instructions. This behaviour may be another form of volitional rehearsal, the same as when participant E performed activities which were not being performed by the group at the time.

In 1985, Atterbury, found that poor readers were impaired on producing rhythms but not on discriminating rhythms. The researcher suggests the reason for this is that listening to rhythms is not the same as physically synchronising oneself to rhythms. Douglas and Willatts, (1994) also found that only rhythm discrimination correlated with reading ability. Kraus (2022) suggests that whilst both entrainment and discrimination of rhythm relate to language skills, the mechanisms which facilitate these skills may differ, which accounts for the ability in some, to discriminate rhythms but not produce them. This would indicate that participant C's ability to produce rhythms would be predictive of effective future reading skills.

Winkler et al. (2009) suggested that the ability to recognise beat is innate and that infants can discriminate different rhythms. However, the ability to synchronise body movements to a beat is something that can be honed, it is easier for some than others. This is important because timing of physical movement is related to auditory processing. When children followed the rhyme, they could interpose a word when invited to do so, so they must have followed the lyrics in their head and memorised what was next. The relationship between rhythm, cognitive-motor and prediction is discussed further in Chapter Six. Performing actions at the same time as vocalising, was more difficult. Children seemed to be able to perform one or the other initially. It was hard to do both simultaneously.

Participant C knew the names of colours; he didn't vocalise any numbers, so it was not possible to evaluate his knowledge of numbers. When the song promoting the concept of left and right was introduced in session two, he did not know left and right. In session seven he demonstrated some knowledge, although not consistently, and in session sixteen he was sometimes correct but sometimes unsure. More practise was required. Over the sessions participant C's engagement increased and he was able to demonstrate an increasing number of skills, he also increased in confidence. By session twenty-two he was demonstrating competency across the array of foundational literacy skills. He possessed, cognitive, language, motor and timing skills which would indicate no cause for concern over his ability to learn to read and write. If a greater number of sessions had been transcribed, then it may have been possible to see more skills demonstrated. This highlights the importance of engagement, as lack of engagement indicates a lack of practise of the skills being promoted. Although the researcher acknowledges that akin to the Vygotskian social constructivist concept of knowledge appropriation, children many re-enact and rehearse skills they have learned in a social setting in an individual setting at a later time. The findings in respect of participant C show that he gained in literacy skill acquisition over the duration of the program.

Participant J was absent for a third of the sessions (8/24) which impeded his ability to acquire the skills being promoted in the program. He was the eldest of the participants, having just turned five years old. He had been deferred for a year due to concern over communication difficulties. He was excited to join the sessions and motivated to participate. The activities and music may have been a catalyst for this;

Putkinen et al. (2013) found that singing (although by parents) was highly effective in maintaining the attention of infants. Although he focussed well due to his positive engagement with the activities, he did not always follow instructions and was observed to be in his own world some of the time, speaking to himself and engaging in activity other than the one being performed by the group. It was possible that his attention in the sessions was greater than in his usual classes, as the Centre Head reported that his participation in mainstream classes was poor. Participant J was able to vocalise his needs, such as asking for the Humpty puppet, but occasionally used gesture only. He was able to interpose some ending words, indicating that he had learnt some of the songs, rhymes and stories, indicating support of his language development and memory recall. He related the Humpty puppet he was holding to the song, 'Humpty Dumpty,' himself, it was not mentioned previously and was very pleased to make this connection, holding up the puppet and smiling.

Participant J smiled a lot and appeared to enjoy himself with frequent vocalisations, sometimes to himself and he answered direct questions. This contradicted the observation of the centre staff when he was in class as they reported his lack of communication. It was very possible that the activities were motivating his improved and more frequent communication.

Participant J demonstrated that he did not know colours or left and right. He was not well co-ordinated and did not demonstrate ability to cross the midline. There was no occasion when he was observed to be moving subconsciously to a beat or rhythm. Although he did not sing, perform an action or interpose a word in time in

session one, other than in the Puddle song, he was able to do so in session sixteen, showing an improvement in his timing skills over the course of the program. He was not able to keep a beat or rhythm. From the lack of skills demonstrated, this would indicate that he may have difficulty with literacy learning.

To address why J might have been able to respond to instructions on time in the puddle song, and not in other songs, the researcher sought an explanation. A possible reason was that the time allowed before the action was much longer in the puddle song. The lyrics and melody – 'If you see a puddle - baby - puppy – mouse – giraffe – motorbike, you have to go …' allows ample time to prepare to make the appropriate sound and there was also a visual to evoke response too. For comparison, in the song, 'Open shut them' A5, the actions are immediate, the performer must open and then immediately close their hands and then be ready to clap next. Initially J was able to open and shut his hands and thereafter lost the gist of the song. In the puddle song each verse has a consistently long space in which to prepare to act. It could be observed that participant J was benefitting from attendance at the sessions in terms of the acquisition of pre-literacy knowledge and skills.

Participant LE, aged four years and eight months, was highly motivated and engaged well with the activities, although he frequently looked as though he wasn't. He often moved around, shuffling, swinging and tapping and sometimes turned away from the group and preoccupied himself with any prop available. Despite this appearing to be 'poor' behaviour, the researcher suspected that at these times,

participant LE was actually reviewing or rehearsing one of the activities, as he could be seen to be talking or singing to himself. He wasn't removing himself from the group to not participate, but was participating to himself. Unfortunately, this could lead to him not being ready to begin the next activity, although he was listening, as when he did rejoin the group, he was able to join in. In session seven in activity twenty-one he appeared to ignore the teacher's questions and continued to investigate ways to construct his bricks. The researched considered that he maybe needed more processing time than was being allowed.

Despite his apparent lack of attention, he was usually listening and able to interact when required, which he did with gusto. He had a speech impediment, a stammer, which did not prevent him from speaking and he was confident and able to answer questions posed and pose questions of his own. He requested his preferred activities which were mostly granted. It is possible that singing can help to ameliorate problems of stammering and Stahl and Kotz, (2014) reported that, the effectiveness of singing as a method of treating a stammer is due to the rhythm and familiarity of the song, rather than the melody. As many of the activities promoted the ability to maintain rhythms, this seemed to be an advantageous program for him. His main problem was apparent lack of focus, (maybe more observed than actual) which led to centre staff often re-directing his attention to the task in hand. He was able to interpose words at the correct time and clap a specified number of claps at the right time. His ability to tap a beat or rhythm improved as the program continued and if he concentrated, he could keep a beat for part of a song (for example, in the second half of Cobbler, Cobbler in session nine). In session seven

he was observed to be moving subconsciously, nodding his head to the music playing. He was quick to respond to what was happening and took initiative in collecting numbers from the wall for Hickory Dickory Dock and presented them in the circle (unprompted) as per the verses and was able to clap in time to the song. He was able to recite numbers in the correct sequence; when counting the pieces on the octachime he went past ‘eight’, having not co-ordinated his speech and movement enough to stop at eight.

Despite any problem caused by his speech production and need to be constantly on the move, he was able to acquire most of the skills required and demonstrated his ability and willingness to engage with learning. Motivation to perform the activities, influenced his engagement and therefore ability to meet the learning outcomes of the program.

Participant M, aged four years and one month, was very eager to participate in all activities and eager to answer questions. She memorised many lyrics well, interposing ending words and mostly paid attention to the presenter’s instructions. She didn’t remember the turtle’s name and said, ‘turtle’ when asked. Her processing was not fast, and she appeared to be uncoordinated when trying to make precise, controlled movements such walking on tiptoe and overbalancing when taking long strides. When waving her arms from side to side in activity twenty, her arms moved separately, not together. Her ability to clap or move at the designated time improved over the course of the program. She didn’t appear confident, looking to the teacher or assistant for validation and frequently had her hand to her mouth or was sucking

her finger or thumb. She seemed also uncertain of colours and misread the number two as five. The program facilitated the elucidation of these issues. She appeared to have a poor sense of self-efficacy.

Self-efficacy is influenced by encouragement and discouragement pertaining to an individual's performance or ability to perform – social persuasion (Bandura, 1977 in Lopez-Garrido, 2023) and a person's belief in their efficacy is influenced by their mastery experiences (they have experience of doing it previously), vicarious experiences (they can or have seen others doing it), and emotional and physiological states. Participant M believed that she could tap the syllables in 'Iron Man' (mastery experiences. and she did, but she didn't believe she could tap out the syllables in 'alligator'. When encouragement was given, and she could see that other children were tapping out 'alligator' (social persuasion and vicarious experience) she built confidence that she could do it and did so with scaffolding from the presenter. Participant M knew that she could tap out syllables but when the word was difficult to pronounce, she believed (knowledge from past experience) that this would impede her ability to do so correctly. She sometimes required scaffolding if she couldn't pronounce a word correctly, for example, missing 'A' from 'America' resulting in three syllables instead of four. She struggled to enunciate the syllables in 'al-li-ga-tor', not recognising a final syllable when she got to 'al-li-ga'. She rolled the 'r' in the word 'girl' resulting in two syllables, but she listened carefully to the sounds and correctly matched the number of syllables with the sounds she produced. Her lack of confidence in her ability was also demonstrated when she asked the presenter to refix the ribbon on her triangle, something that participant

AL did herself, or to put back together the pieces of the mouse puppet when they came apart. She did not take initiative herself and looked to other participants to follow before taking action herself. Over the duration of the program participant M's confidence grew, as did her skills.

Although participant M followed the actions with claves, there was no evidence of her being able to keep a beat or tap a rhythm, but she did move her body in time to music on several occasions and could interpose a single word in the correct place. Although M proffered language readily, a positive indicator of literacy competence, there were other skills which required further promotion, such as her phonological awareness and co-ordination and timing, which could have affected her fluency. These deficits would appear consistent with the findings of Moritz et al, (2013) that rhythmic skill is related to phonological awareness, as these were both problematic for her. Moritz et al. also suggested that intensive music training could lead to improvement in skills; as the program progressed there was an improvement in her skill acquisition.

As the participants moved in to form a circle for the final songs in session seven, she was moving her arms up and down, seemingly enacting an activity from another day. The presenter asked if she wanted to perform the song; she nodded but said, '*No*'. The presenter accepted her response as a negation. She displayed such conflicting behaviour sometimes just through gesture, both shaking and nodding her head. Along with hand sucking, it may have been indicative of immaturity. On two occasions she gestured instead of speaking, tapping her chest to indicate that

she wanted an instrument on one occasion, and that she wanted a turn of the drum on another. She also tugged a picture from the presenter without speaking. This was possibly indicative that she was slow to access the words she wanted to produce.

Participant L, aged three years and eleven months, had a good memory and demonstrated his memory of what he had learnt in previous sessions, - saying ‘splash’ in response to a visual and remembering what construct to make with the bricks. He also remembered the word ‘semicircle’ which he proffered when the presenter asked the group, and also that the presenter liked macaroni cheese. In session one he didn’t participate in all the activities and just watched. In the second session he began to participate, interposing words and commenting on the actions. He was proficient at tapping out syllables and enunciated the words well. As he began to learn the lyrics he sang quietly or mouthed the words, especially the rhyming endings. He was able to balance well while moving and rocked side to side when he ‘drove’ the bus in the bus song. His ability to perform actions on time improved with practice and when he was able to predict them. At one point he moved his body subconsciously to the beat of the farm song. His confidence grew and also his enthusiasm; as the program progressed, he joined in more, supplying ending words; often shouting them enthusiastically, answering questions and showing evidence that he had learnt song and rhyme lyrics. He enjoyed counting and counted his fingers to himself in the rhyme ‘Five Fat Peas’. He also pointed to numbers on the wall and recited them out loud to himself while the presenter asked other participants to provide information about the musical story, ‘My Cat Ben.’ He

had had his turn. His ability to tap in time improved over time. He was able to tap along to a beat and also to a rhythm. He could count and name colours. There were no contra-indications for literacy skill acquisition and as the program progressed it could be observed that his skills were building and that he was integrating and applying what he had learnt.

Participant CA, aged four years and one month, was slow to participate and spoke very quietly, but as he learned the lyrics, melodies and actions he joined in more. He was well focussed and followed the actions of the presenter, responding to and copying the actions before the words. He enjoyed the activities and began to sing the lyrics, often mouthing them rather than vocalising out loud. Consistent with the findings of Hahn et al. (2021) when children are sung to, they are hearing and assimilating language which impacts their later language development. Participant CA was increasingly acquiring vocabulary and his ability to produce spoken language. He tended not to vocalise and do actions together, as he sang more words, he performed less actions. He didn't proffer any unsolicited information but responded when asked a question individually. He remembered the word 'guiro' when asked by the presenter. He found it difficult to enunciate syllables, missing 'spi' on 'Spiderman'. He was able to self-correct, which he did for 'Spiderman' and 'alligator'. He beat out the syllables for 'Batman' correctly the first time. He was able to move and interpose words on time in a song. There was no evidence that he could keep a beat, or a rhythm and he needed more practise in this skill. He was beginning to tap claves on time in session sixteen. Although he had good language and memory skills his phonological awareness and timing were little evidenced,

which could have impacted his literacy learning. As with participant M there may have been a connection between rhythmic production and phonological awareness, but his skills were building as the program progressed.

Participant AV, aged four years and ten months, was only present at thirteen out of twenty-four sessions. In these sessions she was able to demonstrate her knowledge of colours, numbers and left and right. She learned lyrics to songs and was able to interpose missing words, clap in a given space and keep a beat. She could also tap a short rhythm. Her body moved subconsciously in time to the music beat in the first session and she rocked side to side to the song ‘Going Fishing in the Sea’. She was able to enunciate and tap out syllables. She corrected another girl who said she was six years old and told her correctly, that she was four. It was apparent from the observations that there were no contra-indications for literacy skill acquisition. The sessions afforded her opportunity to acquire knowledge (song lyrics), and to practice, demonstrate and integrate her skills.

Participant AL, aged four years and eight months, only attended twelve of the twenty-four sessions. She was able to demonstrate possession of a good memory and good language skills, being able to vocalise clear and correct sentences, including articles. She knew colours and left and right and demonstrated effective fine motor skills in tying her shoelaces. She also demonstrated well balanced gross motor skills and was able to fluently change her gait. She could tap in time to a beat by session sixteen. She was reluctant to engage with some activities, preferring to play with her clothing and didn’t answer any questions posed to the group, although

she answered questions posed directly to her and took initiative in requesting a triangle and in fixing the ribbon on it.

She did not demonstrate ability to tap syllables independently, but this was maybe because she hadn't quite understood what was being asked. When told she had missed a syllable in alligator, she tapped it again correctly. She was not observed moving subconsciously to music. There were no contra-indications to literacy skill acquisition.

As the sessions progressed, gradual skill acquisition and improvement could be observed as participants were given the opportunity to practise these skills. The activities offered an ideal environment in which to promote unpressured and informal skill development at each participant's own pace. The program was also inclusive and participants could participate at their own level. The table below illustrates the skills of the participants at the beginning (S1) and end of the program (S22).

Figure 22.

Skill Acquisition Overview

Skill Acquisition Overview								
Part*	Cognition	Language	*PA	Timing	Motor	*Sub	Knowledge	Needs
E S1	Proficient	Proficient	Mostly Proficient	Some Proficiency	Proficient	Yes	LR unsure	
E S22	Proficient	Proficient	Proficient	Proficient	Proficient	Yes	Proficient	None
C S1	Proficient	N/o V quiet	N/o	Not Proficient	Some	Yes	LR - no	
C S22	Proficient	Proficient	Proficient	Proficient	Proficient	Yes	LR Building	*LR
J S1	Memory?	Weak	N/o	Poor	Some	No	No	

J S22	Slow to follow instructions	Immature use of gesture	Not evident	Improving	Poor co-ordination	No	No	PA Timing Midline
LE S1	Attention poor	Stammer	N/o	Some	N/o	Yes	Not LR	
LE S22	Quick but poor focus	Poor speech	Building	Not consistent but building	Proficient	Yes	Proficient Colours Numbers LR Building	Speech LR Further PA and timing
M S1	Attention	Produces language	N/o	No	Some	Yes	Weak	
M S22	Slow processing	Immature use of gesture	Building	Weak	Poor	Yes	Weak	PA Timing Motor
L S1	Varied	V quiet	Some	Building	Proficient	Yes	Colours Numbers LR Building	
L S22	Proficient	Proficient	Proficient	Proficient	Proficient	Yes	Proficient	None
CA S1	Attention	Quiet	N/o	Some	Some	N/o	Colours no	
CA S22	Proficient	Proficient	Building	Building	Building	N/o	Colours LR no	PA Timing Motor
AV S1	Proficient	Proficient	N/o	Some	N/o	Yes	Some	
AV S22	Proficient	Proficient	Proficient	Proficient	Proficient	Yes	Proficient	None
AL S1	Proficient	V quiet	Syllables building	Building	N/o	N/o	Proficient	
AL S22	Proficient	Proficient	Building	Proficient	Proficient	N/o	Proficient	PA

*Part – Participant and S1 or S22
*PA - Phonological awareness
*Sub – Subconscious body movement in time to music
*LR – Knowledge of left and right
*N/o – Not observed

From the data collected it is possible to determine that through observation of the participants in the sessions, an assessment of foundational literacy skills acquired can be undertaken. The extent to which a literacy-through-music program can be effective in the promotion of foundational literacy outcomes for four-year-old children was found to vary across participants and was commensurate with their initial level of knowledge and skill. Thus, where a participant already possessed the competencies required, they could only practise and improve them, whereas participants without them were able to acquire them or build towards acquisition.

Figure 22 shows that all participants improved in skill proficiency throughout the sessions, notably was language production and ability to memorise lyrics. Most participants improved their ability to tap along to a beat or a rhythm and all participants improved their ability to interpose an action or a vocalisation at the correct time. All participants observed were able to tap syllables; some needed a little scaffolding but were moving towards independence.

In concordance with Musacchia and Khalil, (2020), the evidence here suggests that the use of music as a conduit for learning and especially in this case for the acquisition of literacy skills, would be advantageous.

There is plentiful evidence to suggest that the undertaking of musical activities by young children reaps many benefits (Sheppard, 2007). Children benefit in social, communicative, physical, emotional and cognitive ways. Although the value of musical activities to literacy would seem to lie primarily in its close relationship with language and its ability to focus a child's attention on sound, it is possibly the all-encompassing nature of music and its ability to conflate many skills, deliver knowledge, provide an experience and environment which is conducive to learning and effectively train the brain, which is its most remarkable feature; like literacy, it is integrative by nature.

5.3 Evaluation of the Activities

Analysis of the activities enabled the second question from the literature review to be answered ‘What types of activities might be the most beneficial in terms of the acquisition and practise of foundational literacy skills?’

The participant profiles were consulted to ascertain which activities were cited the most frequently as evidencing skills. The transcriptions were then analysed by activity and coded for the highest occurrences of skills evidenced. Subsequent analysis indicated that the activities in which participants more actively engaged were the ones where most skills were elicited. Again, the data was analysed to find a reason for high engagement. This reason was enjoyment of the activities, and these were identified in Figure 19, page 287. Figure 19 is represented again here for reference.

Figure 19.

Comparison of Literacy Skill Demonstration with Enjoyment and Engagement

Comparison of literacy skill demonstration with enjoyment and engagement	
	Activity Numbers
High frequency of citing (over 20 times)	1, 5, 6, 12, 21, 27
Identification of high impact through inductive coding	3, 5, 6, 8, 15, 19, 21, 26, 27, 28, 35, 42, 50
Identification of enjoyment	5, 6, 26, 27, 28, 35, 42, 50

The activities promoting the most skills and enjoyment were explained in Chapter Four. Further analysis here, examines common factors for the efficacy of these activities. The activities with the highest enjoyment were also the ones with the

greatest impact, it could be observed that enjoyment provided the stimulus for the motivation for engagement. Engagement in the activities shows situational motivation, motivation due to the environment; music is engaging and must in some part contribute to the efficacy of the activities, but as most activities involved music, other features accounted for the engagement.

The data was examined to determine underlying features which might explain why some activities were more enjoyable and had more engagement than others. One area of commonality was ease of performance. In all of the high impact and enjoyable activities, participants were all able to join in at all times. In A5 the song was short and repetitive and ended in humour. This was very popular. Maybe each of these factors contributed to its popularity. Length and repetition may have accounted for the ease of performance of A5 but not of the others.

A common factor between other activities A6, A26, A27, A28, A42 and A50 was that something was happening to focus the participants' attention, but they did not have to perform a rapid or changing response, time was adequate for participants to be ready to respond. A6 was repetitive with a different visual for each verse, which participants had to repeatedly respond to, there was time to look at the visual and listen to the lyrics before they needed to perform an action in response. In A26 the participants had to lay quietly on the floor in a prone position with their arms outstretched like aeroplane wings. They were required to listen to the melody and lyrics until they were required to 'fly'. This allowed time to 'get ready'. The participants enjoyed 'flying', but other activities also involved locomotion but were

not identified as so enjoyable. Later comparison with A15 suggests that a multitude of factors may be contributory.

The activity of tapping out syllables on a drum A27, was very popular and highly effective. Preparation time may have been a contributing factor as each participant had to wait for their turn. Additionally, they had choice as to words to tap out. This may well have contributed also to their enjoyment, as they were able to think about the words and anticipate what they would do. The beating of the drum was also motivational as they enjoyed wielding the large beater on the large drum. Each participant was also scaffolded it they needed help, so each was successful.

The story of the turtle which was sung with actions A28 and had a visual prop was highly popular. It had a strong rhythm and humour. Activities A5 and A28 both made the participants smile. A28 allowed plenty of time for the participants to get ready to perform simple actions as they were able to recall and anticipate the lyrics. Activities A6, A28 and A35 had visual props.

A35 was also a humorous story which had a visual prop and was sung. There were no actions, participants only had to listen to the story. They remembered the order of the verses and the storyline. A42 was also a story, this time about a mouse. Participants had finger puppets which they had to move in response to simple lyrics. They also had to shout. This change in dynamics, as in A27 was enjoyable. A50 was songs with percussion instruments. Choosing an instrument was motivational, as was making different sounds.

In summary, the features of the activities which seemed to account for their popularity and enjoyment and subsequent high impact were:

- ease of performance – possibly due to repetition
- an element of humour
- ample time to get ready to respond
- the inclusion of a visual or hand-held prop
- an engaging story
- involved a change in dynamics.

Most of the high impact activities had a combination of these factors.

Activity A15 a song about boarding a bus, was very popular but did not have a high skill impact as the main skill promoted was that of listening. When the participants' names were sung, the participants had to board an imaginary bus. Again, it was easy to perform and maybe a topic of particular interest, being relevant to the participants' own experiences. It was more than likely easy for them to imagine being on a bus. Additionally, one person was allocated as the driver and sometimes another as a conductor, this was particularly enjoyed. A similar activity A26, Aeroplanes had slightly greater impact on skill promotion as participants were able to vocalise in the song and also to sing along. Participants were not able to sing along to the bus song because it was too fast, and the names were sung randomly, so the participants were not able to predict and therefore sing the names.

A third question, ‘Could a literacy-through-music program be used to identify children who have cognitive, language, phonological or motor deficits, which may be indicative of potential risk of literacy failure?’ can be answered from the data gathered, as suggested from the literature review (Corriveau et al., 2010).

Reference to the brief summary alone, in Figure 19 highlights knowledge and skills for foundational literacy, where the participants were weak and would benefit from improvement. It also highlights in which areas they made progress over the duration of the program. A more in-depth examination of the participant literacy profile reveals greater detail and would enable a teacher to target areas of weakness. As the purpose of an integrated literacy-through-music program is to promote foundational literacy skills, it is possible to highlight problem areas through it, as the teacher or presenter can observe which skills are or are not being acquired over time.

In addition to the promotion of identified skill areas and areas of knowledge is the ability to conflate these skills and to apply them to a task. Where a child is struggling to complete a given task it may be possible to observe the underlying cause of the problem. For example in A27, where participants were asked to tap syllables, the presenter could easily observe for example, if a child was unable to generate a word to tap, which was maybe indicative of poor vocabulary or lack of experience; or if, as in the case of participant M, a child tapped the syllables as they pronounced them but the pronunciation caused syllabification to be skewed, then again the teacher could attend to this by repeated the word and emphasising the syllables. If

a child presented a problem of synchronising the beating of the drum with the vocalisation, then the teacher could support the beater and beat the drum with the child until they gained proficiency. As each activity required the performance of one or more foundational literacy skills, the progress in skill acquisition was easy to observe.

In summary, the participants in the sessions were able to improve their ability to focus on discrimination of sounds through attending to sounds they were hearing (musical melodies, for example) and sounds they were making themselves (playing loudly and quietly, quickly and slowly). They were able to improve their vocabulary (for example adding the words 'guiro, semicircle, introduction, conductor' to their receptive and productive vocabularies. They listened to songs, rhymes and stories and were able to comprehend the storylines and re-tell parts for example, in session twenty-two, activity thirty-five, all the participants described parts of what happened in the story and sometimes all of the stories, for example, participant E sang the whole of activity twenty-eight in session twenty-two. They were able to practise vocalisation and dynamics and to increase awareness of prosody of their own vocalisations. By listening to grammatically correct speech, they were able to improve their own speech and extend simple sentences or phrases, for example, participant CA in session nine, extended his initial response in A6 '*moo*' to '*have to go moo.'* Fluency of performance, as would be expected, improved over time. As the foundational literacy outcomes were being promoted, these were the outcomes which were being observed. Each participant developed over a wide skill area and became progressively proficient at integrating the skills acquired. The use of music

added value to the literacy elements, for example, in terms of memory retention and recall, fluency, timing, creating of a relaxed atmosphere, enjoyment and engagement. As Verney (2011) determined, if music is used as a stimulus, then musical experience will make a greater impact upon literacy skill acquisition than without it.

CHAPTER SIX – UNDERLYING MECHANISMS AND DISCUSSION IN RELATION TO CURRENT THEORETICAL PERSPECTIVES

6.1 Underlying Mechanisms

Alluded to throughout Chapter Five were several additional codes to those pertaining to literacy outcomes, which are worthy of further discussion and analysis which became apparent whilst coding the transcriptions:

- Action versus vocalisation – the actions of the presenter were followed much quicker than the vocalisations; apart from one child at one point
- Language and movement - children struggled initially to perform both simultaneously
- Music, language and movement – children rarely performed these together
- Performance of motor skills in space – personal, peripersonal and extrapersonal space – children needed to be spatially aware
- Repetition of previously performed tasks at a different time – volitional rehearsal
- Finger or hand sucking – this was unexpected by the researcher at this age
- Gestural communication – gesture was used more than was expected
- Speed of information processing and performance varied between children
- Entrainment – observed difficulty with entrainment to a beat
- Varying levels of confidence and self-efficacy
- Embodied cognition – participants were learning through sensory input

- Motivation, engagement and pleasure – it was observable that these were related
- Program delivery – timing, accommodation and presenter ability

Along with the previously observed performance on literacy skills, these observations can be allocated to themes and may help to elucidate the underlying mechanisms which account for the efficacy of a literacy-through-music program. The emergent themes are:

- focus, and attention to sound
- explicit literacy outcomes
- rhythm and time
- enjoyment, engagement and motivation and
- integration.

6.1.1 Focus, and Attention to Sound

The participants demonstrated a high level of focus and attention in the sessions; most likely due to the engaging nature of the activities, being musical and involving the use of props. Initially the focus was visual, as the participants watched the presenter. The participants also watched each other and the additional adult or adults in the room. One participant in particular, looked to others for guidance and reassurance before taking action. The participants watched and followed the actions of the presenter before attending to spoken instructions. Visual focus was

especially acute when props were presented. This high level of focus resulted in the eagerness of the participants to engage with the activities.

It was noticeable that children responded first to the actions of the presenter. It is quicker to follow an observed action than to process and follow a spoken instruction. A spoken instruction requires accurate reception and comprehension of the instruction, then the cognitive processing to enact the action according to the instruction. Actions support spoken language and help children to process language being received. Waterman et al. (2017) found that enactment supplemented children's ability to recall and subsequently re-enact a verbal instruction. The use of physical actions to support language helped children to both comprehend language and to communicate it. This highlights the importance of the use of actions to support spoken language with children. The introduction of music further engaged the participants, offering a wealth of educational benefits and especially those pertaining to literacy outcomes. (Refer to pages 354-355 for a list)

It is vitally important that children are able pay attention to the language sounds of a teacher in a classroom. They must be able to focus their attention to sound and maintain the focus for long enough to comprehend any message being communicated. The ability of musicians to attend to 'speech-in-noise' as may be the case in a noisy classroom, is better than that of non-musicians (Slater et al., 2015). It seems that musical training attunes the ear so that it is better able to focus than for those without such training. It was observed that when the participants in this study were playing their instruments to music, they were still able to listen to

and respond to the instructions of the presenters, an indication that the ability to attend to speech-in-noise is forming. Kraus (2022) also found that the ability to tap out rhythms can predict ability to hear speech-in-noise. This is a particularly useful skill in a noisy classroom.

The participants in the program were required to focus on activities for up to forty minutes. This required constant attention to the sounds the teacher and other participants were making. When children tend to look away or become distracted from the immediate task or become engaged in a task different to one being presented, this can present a challenge for teachers who would like all their students to be listening and focussed on any instructions being given.

However, this study showed that children can be paying attention to sounds when they might appear not to be. It is possible that they are giving themselves time to process the sounds and instructions. One participant in the study was a child who often was seen to be looking away, fiddling with a prop or generally fidgeting or moving about. He could, however, answer any question posed; he learned lyrics, he could also answer questions while looking to be not listening and was able to take initiative and contribute to the activities in a way that other children did not, for example, pre-empting the need for numbers from the wall, and laying them down as required whilst also participating in the activity. His engagement with the activities was very high. It seemed his brain was constantly working. When children are sitting quietly and look as if they are paying attention, this equally might not be the case as their minds could be elsewhere.

The ability to attend to variations in language sounds whether it be the large phonological units of syllable and onset/rime which according to Goswami, (2010) most children develop naturally, or the small-grained units of phonemes, which are believed to develop alongside the learning of sound to symbol correspondence, for many children, but not all, some children seem able to identify phonemes prior to formal literacy learning (Caravolas, 2006), is vital to literacy.

Psycholinguistic grain size theory (Ziegler and Goswami, 2005) suggests that there is a hierarchical relationship between these phonological units with them developing from large to small units; this research would concur with this; the children found it relatively easy to determine the syllables in words. Only one participant generated rhyming words of her own volition and most of the children were only just beginning to recognise initial sounds in words.

Without being able to attend to sounds and to discriminate between them it is very difficult to learn to read and write. As all the activities were based upon sound and most were accompanied by music, the participants' attention was drawn to sound throughout the sessions. The participants all attended well to the sounds in the sessions, which undoubtedly led to improvement in their ability to differentiate sounds. Whilst an underlying feature of the program's success could be said to be its promotion of sound awareness and attention, the enjoyment of the activities was an underlying mechanism for this attention.

6.1.2 Explicit Literacy Outcomes

A strong underlying mechanism for the success of the program was undoubtedly its focus upon the literacy outcomes. Each of the outcomes, although delivered through musical activities were purposefully and explicitly promoted. In a musical program the outcomes are musical, thus, to achieve literacy outcomes, they must be the focus of the program. The use of musical activities to help to achieve these outcomes was as a means of supporting the learning and creating an environment conducive to drawing attention to sounds, and it served as a means to integrate music, language and movement which bolstered learning.

6.1.3 Rhythm and Time

As rhythm is the pattern of stressed syllables in speech, the ability to maintain a rhythm in speech renders it fluent and intelligible. Rhythm contributes to the prosodic features of both music and language, along with intonation and stress. The perception of musical meter is predictive of reading and phonology (Huss et al., 2011). Torgesen (2006) describes prosody as the ‘music’ of language. Prosodic (rhythmic and tonal aspects of speech) features, being variations in pitch (intonation), stress patterns (syllable prominence) and duration (length of time) that contribute to expressive reading of text. Rasinski, 2004 in Torgesen (2006:5) compares the interpretation of musical score through expression to the interpretation of text.

Life is governed by rhythms and time. Bouwer et al., (2021) investigated the rhythmic abilities of human and non-humans and made an important distinction between the ability to perceive rhythm and the ability to produce it. A person may perceive a rhythm, a skill suggested by Winkler (2009) to be innate, yet struggle to synchronise their movements to it. Goswami et al. (2013) averred that children with developmental dyslexia have impaired perception of syllable stress; this impacts their ability to produce rhythms and indicates possible difficulties with literacy learning.

Bouwer et al., (2021) identified various components of rhythm, as single temporal intervals, rhythmic pattern, regular beat or hierarchical metrical structures. These components have been elucidated in Chapter Five in the comparison between a music and a literacy-through-music program. As these features share commonality with music and language, they would be part of both programs. In this study the participants were able to identify single temporal intervals as evidenced by their ability to interpose single words into lyrics, or claps into songs (for example, Hickory, Dickory Dock). They were able to identify and predict the interval and perform on time. The ability to perform on time was governed by the length of the interval and the processing time required by the participant. Essentially, some participants needed more time to prepare for and perform synchronised movements. Fiveash et al. (2023) also suggested that sensitivity to beat and metrical rhythm cues and early capacity is impacted by musical rhythmic experience and that according to Lense et al. (2022) the music of infant-directed singing can entrain infants' social visual behaviour. Exposure to rhythmic experiences through musical rhythm and rhythmic

language, such as that in nursery rhymes, offers the necessary experience to enable children's ability to track and synchronise with tempo changes which relates also to language (Tichko et al, 2022).

In addition to temporal intervals, the activities provided also offered experiences of rhythmic pattern; all the songs and rhymes had patterns which the presenter sought to accentuate by her own vocalisation or movement and/or encouraging that of the participants. For example, in the song, 'Rover', A46, the rhythmic pattern was reinforced by the strong and regular beat, which the presenter stressed with her voice and her movements, and the participants reinforced by movement such as walking, ambling, tiptoeing, or running; the action changed in each verse. The participants were feeling the rhythm as well as hearing it, which helped them to synchronise their movement to the beat. This movement married with the rhythm of the music and language, helped the participants to experience the event through the integration of all three modalities. In this particular activity the duration of beats varied between verses, changing the rhythmic metre; participants had to alter their movements to match the timing of the music, which was further consolidated by the storyline which determined how and why the person in the song had to traverse in a certain way. This research confirms that an integrated literacy-through-music program can promote the ability to synchronise to a beat, which reported in the conclusion of Bonacina et al. (2021) is '*an important indicator of a child's ability to understand spoken and written language'* and that, '*children who performed well on the rhythm task, scored higher than children who drummed inconsistently, on measures of PA, auditory short term memory, rapid naming of both colours and*

objects and musical rhythm discrimination.' Their tests were undertaken on one hundred pre-schoolers aged three to five years.

The participants' ability to perceive the rhythm in a song was evident when they were invited to supply a missing word by the presenter using the strategy of cloze. The concept of time was the determinant of performance. The participants needed time to process what was being asked, time to predict what and when to interpose and time to prepare and organise themselves to perform the appropriate response, whether a vocalisation, an action, or both. Activities which allowed more time to prepare to act were more popular and promoted the most skills. It was possible to observe the participants preparing for this action. Frishen et al. (2022) alluded to the relationship between prediction, rhythm and cognition and hypothesised that prediction builds a bridge between rhythm and cognition. Temporal attending and temporal production affect the way in which a metrical rhythm is processed, which affects the ability of a person to predict. Participants were able to perform in time with a rhythm when asked to do it slowly. The ability to perform at speed builds.

Participants also found it easiest to interject a single action or vocalisation, rather than multiple ones, at a given time and were able with practise to do this on cue. As the number of actions or vocalisations increased, this performance became increasingly difficult. For example, tapping out and vocalising the syllables in words with three or four syllables was more difficult than for words with one or two syllables and tapping multiple taps, for example in the song, 'Tap Your Sticks in the Air' where participants had to tap three times on cue to 'One, two, three' was more difficult than

interposing one word or action, for example, ‘splash’ in the puddle song. Again, the issue was one of being able to synchronise the timing of their performance. As participants had more practise, performance and timing improved.

The simultaneous engagement of auditory and motor skills can be engendered by supporting entrainment to a beat or rhythm. When a person is part of a group performing a movement together, they are more likely to become synchronised with those people than if they are alone synchronising to a sound. According to the PAT hypothesis, (Precise Auditory Timing Hypothesis, Tierney and Kraus, 2014) entrainment practise is the core mechanism underlying enriched phonological abilities in musicians. Entrainment demands sensitivity to timing. Language skills (phrase and word boundaries and phonological awareness) rely on the perception of extremely fine-grained timing details in sound, thus being able to synchronise to a rhythm should support the development of the language skills necessary to underpin literacy. Auditory-motor timing is an acoustic feature in cross domain transfer from music to language. The PATH predicts that musical training which emphasises entrainment will be particularly effective in enhancing phonological skills. It is logical that entrainment through musical activities which specifically targets language and PA skills is likely to have an enhanced effect. Furthermore, the ability to entrain to a beat encourages fluency of auditory-motor timing; a skill required for reading and writing fluency.

In the case of participant J, with possible communication delay, he demonstrated no natural propensity to keep a beat or ability to synchronise to a beat, whereas

other participants demonstrated their natural rhythm, even when they were not able to synchronise to a beat or rhythm when asked. It is hoped that the program would have been particularly beneficial to him. Verney (2011) suggested that music interventions were successful in their ability to improve rhyme and syllable awareness due to their rhythmic element. The body does not subconsciously move in time to speech in the same way as it does to music as music is motoric. If, as Fiveash et al. (2023) suggested rhythm development is experience dependent, then the rhythmic activities provided should be beneficial to all children.

Particularly pertinent to this study is the finding of a relationship between rhythm and reward. Fiveash et al. (2023:35) asserted that, '*rhythm and reward appear to be intricately linked in the brain'* and that while rhythm can enhance reward, reward can boost synchronisation to rhythm, which might explain the inclination of participants to enjoy and engage in activities.

6.1.4 Enjoyment, Engagement and Motivation

Enjoyment was identified by observing the participants' behaviour and vocalisations. Occasions when the participants smiled, giggled, laughed and requested repeats of activities were taken to be indicative of enjoyment. That they were eager to participate and offered answers to questions was also indicative of the participants' enjoyment. Music is generally regarded as enjoyable and as having a positive impact upon the brain (Salimpoor et al., 2011; Blood and Zatorre, 2001) and engenders a relaxed state by inducing the release of dopamine which facilitates

happiness. This is advantageous to learning as stress inhibits plasticity. Music is processed by the amygdala which controls mood and emotions; listening to music triggers the release of dopamine, a neurotransmitter that plays a role in pleasure, motivation, and learning and combats anxiety.

When the activities involved locomotion or performing physical actions, this also was enjoyable and additionally, helped to foster language development by reinforcement of word meaning by acting out the words, for example, ‘stamping,’ ‘tiptoeing,’ ‘running’ and ‘walking’ in activity 46. It helped vocabulary extension by helping to embed greater meaning to the words being spoken; also supporting memory retention and later recall. The musical activities also provided motivation for vocabulary learning. For example, one participant wanted to be and therefore vocalised her request to ‘be the conductor’, another participant vocalised ‘guiro’ as they wanted the guiro to play.

When selecting instruments, participants particularly liked ones which involved the co-ordination of both hands by beating the instrument with a beater. For example, the triangles were very popular; also, the octachime and guiros, maybe for their additional novelty features – a new name and shape. The shakers, requiring only one hand, were the least popular choice. The guiros also had multiple modus operandi, being able to be hit or scraped and one of the guiros could also be shaken. Another possible motivation was dynamics. The participants enjoyed playing their instruments loudly and also using their voices loudly, for example in activity forty-two, shouting ‘Grandma, Grandma.’

In addition to music fostering a positive learning environment, the production of props was also met with excitement and pleasure. Participant LE, for example, asked to hold the book for ‘Puddle’ and for ‘My Cat Ben’. He also wanted to hold the Humpty puppet and chose instruments enthusiastically. The use of props afforded participants the opportunity to engage more fully with the activities and to be part of their production, rather than a passive observer. The visual props enabled the activities to become realised, without having only to rely on imagination. At this age, children need visual stimuli in order for them to be able to build an imagination. It is very difficult to envisage a ‘turtle’ for example if a person has no visual reference to one. Whilst a visual representation is better than no representation, realia offer an even better referent and can help to embed new vocabulary. The activities with visual props also related stories and/or information (Puddle, My Cat Ben and Turtle). The stories of My Cat Ben and Turtle were also engaging for the participants. They quickly learned the lyrics for the Turtle song and the lyrics and sequence of the verses for My Cat Ben. It is possible that humour was also a motivational factor is these activities. The combination of prop, music, movement and story may have contributed to the effectiveness of the activities.

In terms of enjoyment, passive listening to music was surpassed by singing; performing actions too surpassed singing along with the presenter. Using instruments or props and/or moving engages increasingly more parts of the brain, maximising the capacity for learning. In accordance with Fröebel (1895b), who believed that children have a desire to do something, it could be observed that the participants wanted to ‘do’ rather than be inactive. The literacy-through-music

activities offered an environment in which they could ‘do’ as little or as much as they wished. They were also offered choice and were partially included in the program design when offered choices of instruments, songs and words to tap syllables to, for example, within the framework being delivered. The program was not only being delivered to them, but they became increasingly part of it; which gave them a sense of agency. The participants were also able to interact with each other and social skills were encouraged, for example, when waiting for a turn or passing on and sharing instruments.

The participants enjoyed repetition, which promoted familiarity with the activities and ensured also that they were able to participate. Repetition supported memory retention and recall. They also enjoyed activities which included their names, as this facilitated participation and a sense of inclusion. Increased participation fostered enjoyment and enjoyment fostered increased participation. Increased participation led to the highest impact upon skill acquisition.

It seems that music is intrinsically rewarding and Fiveash et al., (2023) explain a possible reason for this as being the link between rhythm and reward in the brain. Movement increases the supply of oxygen to the brain and induces the release of mood-enhancing chemicals. If music induces movement, then both the movement and the music itself will have positive impacts upon the brain.

As the program proceeded, the participants became increasingly confident as they settled and began to enjoy the activities. This was apparent in their growing

engagement over the duration of the program. Demonstration of self-efficacy was observed to vary between participants, with one clearly demonstrating high and one demonstrating low self-efficacy, with the other participants on a continuum in between. A surprising observation was one of finger or hand sucking, which several participants engaged in. It was unexpected to the researcher at this age and confirmed by Thadchanamoorthy and Dayasiri (2021) who considered digit sucking after thirty-six months to be prolonged. It was therefore considered whether this could be due to any anxiety as it is a self-soothing behaviour. However, upon reflection and review of the data, the participants did not appear to be anxious and the most confident participant at one stage, sang with her hand in her mouth. It was concluded that this behaviour was simply one of habit or an indication of immaturity. This habit can continue to up the age of six years.

Enjoyment induces motivation, which promotes incentive and volition to learn. Illeris (2009:12) alluded to the importance of incentive to learning and that students need to mobilise their mental energy if they are to learn effectively. He proposed that how students experience a situation and the feelings evoked by it will affect their motivation to learn, their degree of interaction and subsequent construction of knowledge and understanding. If students are disinterested in a topic, then they are unlikely to engage fully.

A final catalyst for enjoyment was when an activity was relevant to the participants' own experience and one which could therefore stimulate their imagination. The song about going for a ride on a bus and the song about being an aeroplane were

both requested repeatedly. Both were relatable to the participants. They were able to imagine going for a ride on a bus and flying like an aeroplane. When a topic or subject is relevant to a child's own experience it has greater value to them, and it is easier for them to adopt it into their schemata.

The importance of emotion, in this case joy, and its connection to engagement and motivation in an educational environment is confirmed by Tyng et al., (2017) who in their concluding remarks, confirm substantial evidence that '*emotional events are remembered more clearly, accurately and for longer periods than are neutral events,'* thus impacting capacity for learning. The Finnish curriculum (Finnish National Board of Education, 2010) states that '*children have a right to learn through play with joy'* recognising the significant role that enjoyment has upon learning.

6.1.5 Integration

The over-riding, prevalent theme observed throughout the program was that of integration. One participant stood out as possessing the knowledge and skills which were identified in the literature review as being indicative of future literacy success and also demonstrated that she could coalesce these for effective application to a given task. The other participants were building their knowledge and skills throughout the program. The length of the program was not sufficient for all participants to acquire all the knowledge and skills, yet all demonstrated the ability to integrate and apply what they knew and could do.

The activities facilitated the integration of auditory, cognitive, motor, sensori-motor, language, social and emotional skills. Performance of various skills simultaneously, engages multiple areas of the brain, thereby broadening capacity for learning. The activities presented naturally integrated music, language and movement. In order for the participants to perform the activities fully, it was also necessary for them to integrate these three areas of learning.

Many areas of integration of music and language skills were observed throughout the program and the participants acquired music and language skills simultaneously as illustrated in Figure 23. For example, as participants learned the rhythm in music, they simultaneously learned the rhythm in language as the two were presented together; as they moved and sang to the beat of the music, they were also learning to recognise language meter.

Figure 23.
Integrated Skills Observed

Musical Skills	**Language Skills**
Rhythm in music	Rhythm in language
Listen to, move and sing to a beat	Recognition of language meter
Singing is musical it matches the melody	Production of language and language comprehension
Vocabulary is required with correct pronunciation*	Correct pronunciation facilitates reading and spelling
Musical tone may indicate language tone – happy or sad	Language tone is indicative of meaning
Musical prosody aids comprehension	Awareness of prosody aids comprehension – stress and intonation facilitate identification of syllables
Vocalisation – singing aids confidence building	Vocalisation supports language production and self-efficacy
Awareness and discrimination of musical sounds	Awareness and discrimination of language sounds - PA

Music has structure and pattern	Language has structure and pattern
Listening, focus and attention to musical sounds	Listening, focus and attention to language sounds
Motor skills – vocal and body movements with music	Motor skills – vocal and body movements with language
Emotional awareness – music evokes mood and feelings	Emotional awareness – language expresses mood and feelings
Memory of melody and actions and recall	Memory of lyrics and actions and recall
Audiation – observed when participants followed an activity then interposed part of a song with the melody	Audiation – observed when participants followed an activity then interposed an action or vocalisation
Knowledge of books and concepts of print – The book 'My Cat Ben' in particular, helped participants to gain knowledge of books and print, also the resource book, a book on clapping games and an alphabet book. Music and language were integrated as participants sang the songs in the books, whilst observing the practice of reading by the presenter.	
Soft skills: self-regulation, motivation, volition, creativity, self-efficacy, teamwork and imagination	

* According to Crystal (Crystal, 1976) the intonations of speech are cancelled out by a song's melody and musical beat cancels out the rhythm which accounts for a general loss of accent when a person is singing. The features which make accent, are not possible to reproduce when singing unless a specific effort is made to do so. However, songs still have prosody and rhythm in the lyrics, but melody tempers the strength of accent. When syllabic music is used, as in the program in this study, then the rhythm in the music will support the rhythm in speech. Singers tend to stress syllables as accented in music and to elongate vowels. This is because the air pressure used to make sounds is greater when singing, thus changing the quality of the sound and subsequently, accent.

It was observed that the process of gradual integration of skills followed a broadly linear progression:

1 Listening + focus and attention – development of awareness of the sounds in music and language

2 Listening + focus and attention (awareness of sounds) + movement (performing actions)

As each participant focussed their attention and listened to the presenter, they were able to increase their awareness of the sounds in music and language, which enabled them to begin to join in.

3 Listening + focus and attention (awareness of sounds) + movement (performing actions) + awareness of rhythm and beat (synchronising movements to music and language)

Participants began to join in with clapping and beating in time.

4 Listening + focus and attention (awareness of sounds) + movement (performing actions) + awareness of rhythm and beat (synchronising movements to music and language) + interposition of a word or words at the right time

Some participants at this point were able to interpose a word at the right time but not synchronise their movements in time. A single word or movement was easier to perform than multiple ones. Participants were observed to initially perform one or the other – vocalise or perform an action, the ability to perform both simultaneously took more time to accomplish.

5 Listening + focus and attention (awareness of sounds) + movement (performing actions) + awareness of rhythm and beat (synchronising movements to music and language) + gradual recall and production of song or rhyme lyrics in time.

Over time, participants were increasingly able to move and vocalise at the same time.

6 Listening + focus and attention (awareness of sounds) + movement (performing actions) + awareness of rhythm and beat (synchronising movements to music and language) + gradual recall and production of song or rhyme lyrics in time + phonological awareness

As time progressed, participants were increasingly able to produce a greater number of lyrics to songs and rhymes and to synchronise movements for a longer period of time. They also became attuned to the segments of language sounds – syllables and rhymes.

The learning of concepts such as colour, number recognition and left and right was a gradual process based on time and repetition. Additional facilitators of learning – motivation, relevance to participant and volition for example were also contributory factors to learning.

The underlying themes themselves were inter-related, focus and attention to sound, rhythm and time, enjoyment, engagement and motivation. The literacy outcomes are also inter-related, with each supporting the other.

Learning is an integrated process with learners assimilating new information into previous knowledge or skills. The concept of embodied cognition assumes a relationship between the body and cognition; action and cognition are inextricably

intertwined. Embodied learning also assumes interaction of the body with the environment, an idea enshrined in Reggio Emilia philosophy where the environment is considered as a third teacher, the first and second being the child and the teacher.

Macrine and Fugate, (2022) advocate for a holistic approach to learning and teaching and assert that embodied learning can support vocabulary acquisition, language development and comprehension, and handwriting. The research finding herein support this view, with the data offering a wealth of examples of embodied learning, where the participants were learning from the environment through multiple senses. For example, in activity 46 (Rover) the participants needed to employ a large network of brain structures – auditory, visual, proprioceptive and vestibular, in learning to entrain to a beat as they listened to music and song and followed the presenter's example in moving their bodies to the beat. Sound is naturally embodied, being received through vibration to the body, via the ear and kinaesthetically.

In order to learn to write a child must be able to manipulate a writing implement. The challenge of controlling and manipulating a tool is greater than simply using one's hand. There are many early years activities which help to strengthen body core and hand muscles which support this ability. Children need to be able to grasp, grip and manipulate objects. Object control skills also stimulate the brain. In the musical activities presented in the program, co-ordinating left and right body sides to play an instrument through striking one tool against another or a hand and a tool or even controlling one hand to shake a shaker in time to a beat, supported the

acquisition of this skill. Beating out syllables on a drum with a beater presents a more challenging task than striking a drum with a hand. This activity teaches object manipulation, the brain integrates the beater into the body schema and extends perception of peripersonal space. It is an additional way of exercising the brain. When the participants were required to make a long, short, fast or slow sound with the instruments then they were further required to think about how to accomplish this task and then have the physical control and pressure to achieve the desired effect. The manipulation of an unstable object, the triangle, was an additional challenge and the player had to adapt to friction, weight and movement.

Merleau-Ponty (1996) referred to the ability to know where body parts are in relation to each other and in space – proprioception, as being an integral part of learning. In contrast to preschool activities such as manipulating playdough, or picking up cotton wool balls with tweezers, beating syllables on a drum with a beater integrates language, cognitive and motor skills and when children are beating rhythms with instruments to music the activity becomes even more multi-modal as the children are required to listen and to internalise the music, co-ordinate left and right hands, and synchronise their body movements to a beat; if they manage also to sing along in tune and in time, then the brain is employing an increasing number of neurons and connections to also facilitate memory, and language production and comprehension. Some activities such as ‘The Grand Old Duke of York’ or ‘Marching to the Drum’ require additional locomotion skills as the children are also moving and in time to a beat. Such activities required the participants to integrate a great number of skills, all of which were contributory to literacy learning. In the activity

‘Aeroplanes’, the participants required greater awareness of themselves in space in relation to others as they were required to ‘fly’ quite quickly around the room with their arms outstretched; this necessitated the ability to avoid others whilst being aware of their additional width and the ability to predict the timing of movements of themselves and others and to respond in time to avoid any collision.

There was observational evidence that the activities helped the participants to integrate movement and language; for example, lyrics in activity 19 were ‘*Clap and clap and clap, together, clap and clap and clap and stop’*. The participants matched vocalisations with movements and reinforced their ability to keep time through multiple senses. Activities such as the ones with finger mouse puppets were multimodal, in that they used sight, sound, kinaesthesis and tactility to foster learning. All participants engaged fully in these activities, being enraptured by the mice and their stories. The activities with the finger mice were rhymes and the rhyming words were emphasised by the presenter, who used the strategy of cloze to draw from the participants the rhyming words at the end of rhyme lines. When children repeatedly hear and vocalise the matching sound patterns in words, they become attuned to these patterns, which ultimately inform their reading and writing. The rhyming activities in the program served to induce this attunement and the participants often enjoyed interposing the rhyming words and did so with zeal. It was noted that while language and movement were modelled simultaneously by the presenter, participants would often perform one or the other, it appeared more difficult to perform language and movement together. When only one word and one action were required then this was simpler and more likely to be actioned. It became

clear that the synchronisation of vocalisation and movement required greater concentration and focus than one or the other. Cognitive, language and motor skills need to work together also when children write. Brodsky and Sulkin, (2011) found evidence of this in that children's handwriting skills improved when they did hand-clapping games. Although this research has not included handwriting tasks, the researcher acknowledges that the activities will also promote skills that will support future writing ability, such as the ability to integrate cognitive, language and motor skills.

There is much evidence that musical experience can help to foster the many skills required for literacy, not least, due to the plethora of benefits which can be bestowed therefrom (Kay, M., 2017:11).

These include:

- Stimulation of the brain (Schlaug et al., 2005)
- Musicians have faster neural responses to music and speech sounds (Strait et al., 2009, 2012, 2014)
- Benefits to speech processing (Patel, 2014)
- Increase in attention (Dewi et al., 2015; Putkinen et al., 2013)
- Assistance with memory recall (Parbery-Clark et al., 2009)
- Music is motoric (Toyka and Freund, 2007)
- Movement in turn stimulates the brain (Eliot, 2000)
- Enhanced detection of 'speech-in-noise' (Parbery-Clark et al., 2009; Slater et al., 2015)

- Assistance with memory recall (Janata, 2009)
- Music can entrain movement to a beat, thereby helping co-ordination (Corriveau and Goswami, 2009; Slater et al., 2013)
- Improving movement in time to music may improve temporal processing (Goswami, 2013)
- Music is engaging, thereby attention-grabbing (Tierney and Kraus, 2013a)
- Listening to and engaging in musical activities helps to reinforce children's awareness of speech segmentation (François et al., 2013)
- A possible increase in literacy scores in school (Slater et al., 2013)
- Improving auditory skills (Putkinen et al., 2013)
- Promoting imagination (Welch et al., 2011)
- Helping to engender a sense of achievement (Salimpoor et al., 2013)
- Helping to build children's confidence (Ofsted, 2012)
- Enjoyment (Salimpoor et al., 2013)
- Production of chemicals (dopamines) in the brain which induce happy feelings (Salimpoor et al., 2013)
- Creating a positive environment (Fisher, 2001)
- Encouraging social skills (Gerry et al., 2012)
- Inducing a relaxed and therefore suitable learning state (Thoma, 2013)

Tierney and Kraus (2013a) aver that 'one of the reasons musical training can be such a powerful educational tool is that music is inherently rewarding, emotion-inducing and attention grabbing' (Menon and Levitin, 2005, Patel, 2011 and 2013 in Tierney and Kraus, 2013a).

Kraus (2022) asserted that experience of sound, and language and music in particular, make changes to the brain and that the way a pre-literate child processes the ingredients of sound – pitch, timing and timbre – can predict future reading ability. Although determination of pitch was not a specified goal of this program, the activities, being musical in nature, involved attention to changes in pitch; similarly with timbre, the participants were able to experiment with various instruments and compare the types of sounds made.

An additional, yet vital observation was that of the presenter's ability. The presenter needed to possess sufficient literacy learning knowledge and some musical knowledge to orchestrate the effective facilitation of the sessions. The presenter needed to be able to integrate these two areas by demonstration and to encourage the children to participate similarly; it required effective teaching. Despite the term 'presenter' being used the sessions were more than simply delivered. The presenter assumed a teacher role and as such was required to facilitate learning. A report by Guerriero, (undated) asserts that teacher quality is an important factor in student achievement. After qualifications and experience, Guerriero considered pedagogical knowledge as an indicator of teacher quality. It is imperative that educators are given the opportunity to learn, understand and be able to implement the best and most appropriate practices. She refers to a model of professional competence adapted from Blömeke and Delaney (2012) which combines cognitive abilities with affective-motivational characteristics. A teacher must know not only their subject area and how to teach but must be able to teach. Early years is a specialist area requiring a great deal of knowledge and skill plus understanding of

early years' children and their needs at the most developmentally vital stage in a child's life, yet the childcare workforce in the UK is at the lowest end of qualification and payscales. This is a marked contrast to the highly qualified and highly paid early years teachers in Finland. A study in Ireland by Moloney in 2010 of early years educators, found that professional identity was contentious and problematic and that perceptions of early years practitioners were that they worked in 'playschools' and as such, gained less respect than their higher-grade school counterparts. As Moloney pointed out, this raises fundamental questions about the value of early childhood and of those working in this sector in the UK.

There were two further observations worthy of note. The first is that children used gesture without language. Differently to putting up a hand to offer to answer a question, two of the participants used gesture only to convey meaning. They both used the same gesture, which was pointing to themselves to indicate that they wanted something. This was not in response to questioning. One child repeatedly patted her chest when the presenter was speaking to other children and giving out instruments. She was indicating that she wanted the instrument that the presenter was holding but she didn't vocalise her request. The second was also in relation to the instruments. While the presenter was demonstrating the use of the guiro, the second participant pointed to himself. He was not given the guiro and later when the octachime was presented he verbalised '*I want that please, I want it.'* This serves to indicate the importance of gesture to children, the link between cognitive, motor and language systems and that it has a part to play in their communication

development. This further endorses the use of action songs and rhymes to support language development.

The second, was that some participants were observed to be repeating activities to themselves at times other than when they were being performed in the sessions. Although the mind had wandered from the current activity, it had wandered to related activities. It appeared to be an almost subconscious action, yet prompted by the sessions themselves. The participants at these times were rehearsing previous activities. This is described by Vyas et al. (2018) as overt rehearsal. This may be preceded by covert rehearsal, as would be the case if the participants' minds only, had wandered to the activities they were rehearsing.

There was no external suggestion that the participants were required to learn or remember the songs or activities at the time, which may have prompted this behaviour. On one occurrence, the prompt was the accidental playing of music, when one participant began to enact the actions to the song, an example of auditory-motor engagement.

There was evidence that the mention of the activities was enough for some children to overtly rehearse. For example, participant E in S7 A12 appeared to be looking into space and not paying attention, but she was actually singing the forthcoming song to herself, which the presenter had just introduced but had not yet begun. When something is brought to mind by an external stimulus it is not surprising that a person will enact according to it. Participant L began to read out numbers aloud

to himself, when he saw them on the wall; what prompted this behaviour at this time is illusive as the other participants could also see the numbers but were not reciting them and the current activity was the musical story, My Cat Ben.

However, on other occasions there seemed to be no stimulus to prompt the action other than the participant themselves. I have termed this ‘volitional rehearsal’ as it appeared to arise of the participants’ own volition. Velasquez et al. (2023) used the term ‘refreshing’ to describe the involuntary reactivation in the mind of a mental representation that was activated moments ago. It is possible that the observed behaviour is similar to this but that the mental representation is of an activity from a previous time, earlier in the day or in previous sessions, which subsequently becomes presented as overt rehearsal. Vyas et al. (2018) asserted that covert rehearsal transfers to overt rehearsal; it is not possible to know if this occurred prior to the participants’ overt re-enactment of activities.

A possible cause, but only supposition, of this behaviour could be enjoyment, and a desire to perform the activity again. Guy and Cahill, (1999) found that memory was enhanced by overt rehearsal when an event was an emotional one. In Guy and Cahill’s study, the events were provided by the researchers and overt rehearsal invited, contrary to this study where the overt rehearsal was volitional. However, the positive emotions felt by the participants would contribute to memory enhancement from the rehearsal, according to their study. If the activities were not enjoyable, it is doubtful that the participants would be re-enacting them of their own volition. As

repetition reinforces learning then this behaviour is likely to increase participants' learning and can be seen as a positive outcome of the program.

Ultimately, the experience of conflated music, movement and language activities which were focussed on pre-literacy outcomes, offered an environment in which the participants were able to build or begin to build, the foundational knowledge and skills which would equip them for further formal literacy learning.

6.2 Discussion of the Findings in Relation to Current Theoretical Perspectives

Concurrent with the theoretical and philosophical stance of the researcher, cited in Chapter Two, this research was conducted in accordance with the belief that learning is embodied and that it is constructed from the socio-cultural environment of the learner. It encompassed Fröebel's philosophy that it should be joyous, social and include motor and free expression, have a sense of purpose and it similarly used music as a mode of teaching. Learning built on prior knowledge, congruent with Bruner's philosophy and learning came from the environment, in alignment with Vygotsky, Bruner and the work of Reggio Emilia. One of the underlying mechanisms of the success of the program appeared to be the integration of all learning domains and the apparent embodiment of learning.

Mavilidi et al. (2023) describe embodiment as a pedagogical tool to enhance learning and highlight the role of movement in shaping high-order cognitive processing. They state that embodied cognitive neuroscience links the brain, body

and broader environment and that these show the positive effects of movement upon learning. For young children especially, learning is more effective from embodied conditions than passive ones and also affects retention (Goldstein et al., 2022). Improvement in language and memory has also been found through embodied learning by Kosmas et al. (2019) and Sani et al. (2021).

Macrine and Fugate (2021:3) refer to the fact that *'Our current educational delivery systems and approaches can be traced back to 'disembodied views' of human thinking.'* This alludes to the general gap between what is known about how children learn, that they should be moving, and the observation of classroom practice, that they are sitting. This program offered one in which children were actively engaged for most of the time and would thus promote embodied thinking and learning.

In addition to acknowledgement of the role of embodiment and perspectives on learning theory, this research builds upon prior research on how children become literate and how music can contribute to literacy learning.

The simple view of reading proposed by Gough and Tunmer in 1986 (in Duke and Cartwright 2021) proposed that decoding x comprehension = reading (comprehension of text), suggesting that the process of learning to read involved learning to decode and being able to understand spoken language. The combination of these would result in the comprehension of written words, that is, reading. In 2020 Hoover and Tunmer expanded 'decoding' to 'word recognition' to include the reading of words which were not decodable such as the words, 'one'

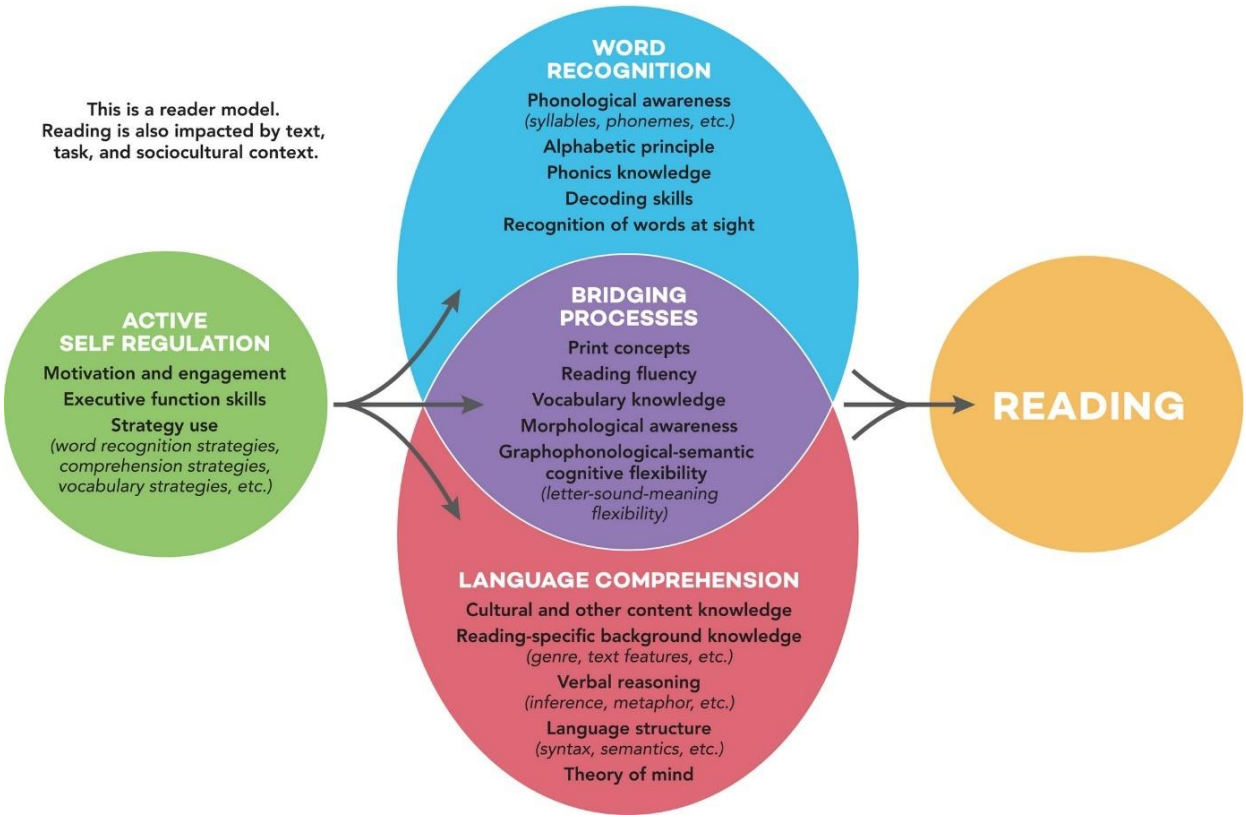
and ‘two’ which do not follow regular sound to symbol correspondences. They also replaced ‘comprehension’ with ‘language comprehension’ to add further clarification.

This simplistic view does not consider any processes that bridge word recognition and language comprehension, any other possible causes of reading difficulty or the influence of self-regulation upon the process of learning to read. Duke and Cartwright (2021) expanded the simple view of reading by adding these to their theory and proposed ‘the active view of reading.

This active view of reading further expands the simple view of reading to incorporate many more influences upon successful reading ability. Such models, there are others – The Reading Rope (Scarborough, 2001) and Dual Route Theory (Coltheart, 2006) for example, serve to inform and guide teachers in their pedagogy and reading instruction. Theories on reading relate to the gaining of information from text. These are useful for the provision of information as to where preschool children are heading in terms of literacy learning and many of the contributory factors to reading are identified similarly in Figure 2. Foundational Literacy Competencies.

Figure 24.

The Active View of Reading



(Duke and Cartwright, (2021)

Burns et al., (2023) further investigated interventions which included the elements of the active view of reading and found that the bridging processes had the highest impact upon reading ability, all of which may be promoted through musical activities.

However, many of the elements depicted on the chart in Figure 24 refer to the actual process of reading, for example – decoding skills, recognition of words at sight, reading fluency and word recognition strategies, rather than the elements leading

up to this point, which is the area to which this research refers. Most research tends to focus on the point at which children are beginning to read as this is the one most relevant to reading teachers. The task of writing is even less considered in the literature, whilst the language, physical and cognitive skills involved writing can simultaneously support the reading process.

The active view of reading does not consider the inter-relationship of all contributors to reading success and does not consider any physical involvement in the process. Nor does it consider language production, specifically pronunciation, which is fundamental to how written words become embedded in the brain through the process of orthographic mapping, along with word recognition and word meaning.

A focal aspect of this research is that if the pre-cursory knowledge and skills are not in place at the same time as children receive formal literacy teaching, then children without these pre-requisite attributes are likely to struggle. The constructs which guide the time when literacy skills are building, that is, from birth, are those of emergent literacy and reading readiness. The concept of emergent literacy offers a closer opportunity for analogy with this study. The maturationist view of Gesell from 1925 (in Rohde, 2015) believing that children reach an age at which they are ready to begin to learn to read, hence the introduction to literacy upon school entry, was challenged by Clay in 1966 who determined that behaving like a reader or writer was a step to realising these abilities and that the instructional scaffolds used by educators are important to a child's literacy learning; also that these behaviours do not emerge at a specific time but that they begin to build on a continuum. Thus,

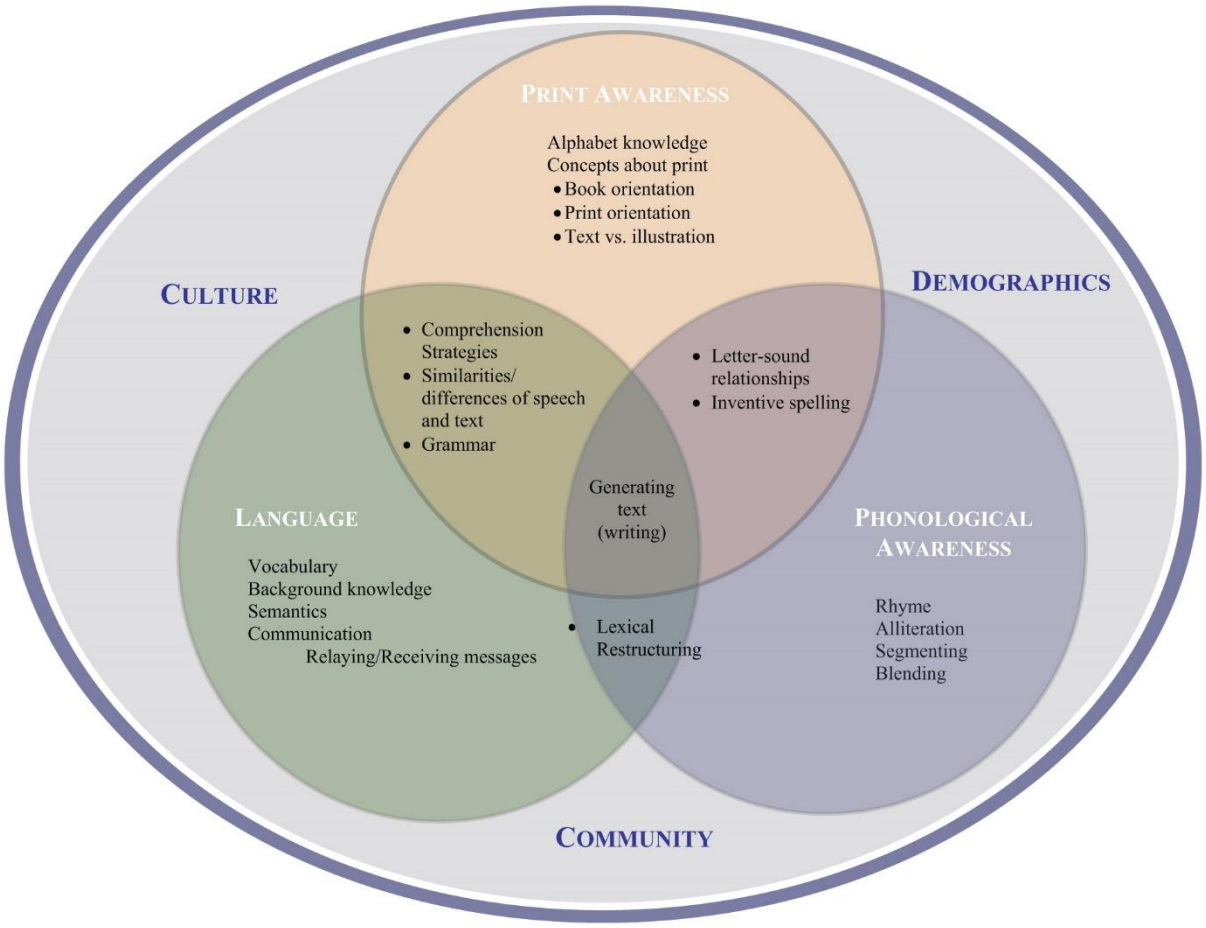
emergent literacy, results from a combination of environmental stimulation and educator (parent or practitioner) support and builds over time. This time varies for all children.

Based on previous models of emergent literacy - The Outside-in, Inside-out Model and The Four Component Models, in 2015 Rohde developed The Comprehensive Emergent Literacy Model (See Figure 25).

One of the main additional features of this model was its inclusion of environment as an important factor in literacy development. It also recognised the process of becoming literate as an interactive and holistic one rather than as series of individual components, identifying the overlapping elements of print awareness, language and phonological awareness. It also recognised that the generation of written words involves the interconnection of all the other elements. Lexical restructuring, is a hypothesis to explain that increasing vocabulary necessitates increased awareness of varying phonemes in words, for example, the onsets in the words, ‘ship’ and ‘chip.’ It suggests that an increase in vocabulary therefore leads to an improvement in phonological awareness. It does not however refer to the importance of rhythmic or motor skills to the literacy process.

Figure 25.

The Comprehensive Emergent Literacy Model



(Rohde, 2015)

Lessons which involve physical activity have been shown to increase academic scores (Petrigna et al., 2022); this is because movement stimulates the brain. Furthermore, as music is motoric, then the use of movement through music should amplify the impact of learning. It is surprising that literacy learning models do not incorporate these important aspects of learning, given that both music and movement are referred to in early years curricula. Acknowledgement of the role of

movement in learning is more likely to come from a musical perspective, for example, Abril (in Colwell and Webster (Eds.) 20ll:94) refers to the idea of '*movement as knowing and thinking'* and refers to music and movement as '*mutually reinforcing phenomena'*.

The PATH (Tierney and Kraus, 2014) explained earlier, built on Patel's OPERA hypothesis to explain how musical experience can enhance language skills due to cross-domain enhancement. Proficiency in oral language plus an ability to recognise and manipulate language sounds (PA) underpins proficiency in written language. The plethora of additional previously highlighted benefits of engagement in musical activities, not least, rhythm and movement serve to further bolster learning in a literacy-through-music environment.

By incorporating learning theory, the concept of embodied learning, theoretical perspectives of learning to read, the concept of emergent literacy and the beneficial aspects of music to literacy, it is possible to move towards a theorised approach from which to build a model to explain how an integrated literacy-through-music program can be used to successfully support foundational literacy skill acquisition.

It is pertinent here to review figures 3 and 4 from Chapter Two, on page 88, illustrating how the development of perception of sound may affect a child's readiness to learn individual letter sounds. It can now be appreciated that this is dependent to some extent upon the prior experiences with which children have engaged. Readiness to read is not a function of age but one of previous learning.

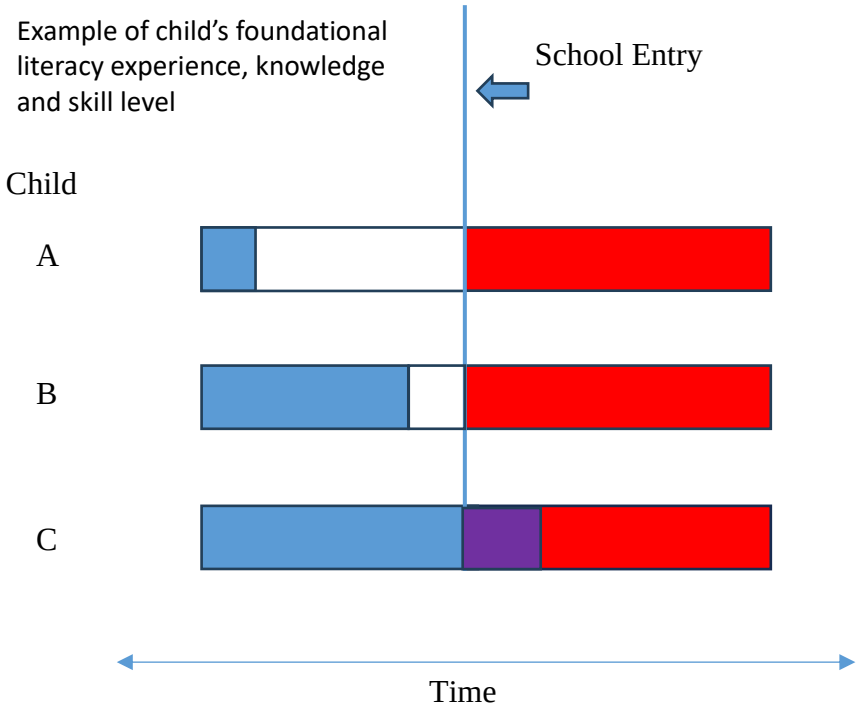
Contrary to this thinking, Morphett and Washburne in Morrow (2012:14) suggested that reading instruction should be postponed until the mental age of 6 years 6 months as they considered this to be an appropriate age of maturity. Even at this age, if a child has not had sufficient experience to equip them with the pre-requisite knowledge and skills to engage with literacy learning successfully then the age will be irrelevant. Carson et al, (2013) also identified the age of six years as one before which an intervention (possibly one to train phonological awareness) could reduce the number of children at risk of literacy failure. The identification of this age as important is due to the first seven years of life being the one when the brain is at is most plastic and therefore considered to be the most receptive to learning. The campaign 'Upstart Scotland,' in Scotland is promoting the introduction of a kindergarten stage, with a later school start at the age of seven years. This is to enable the all-important precursors to literacy to be put in place before formal literacy learning begins. The person spear-heading this campaign and who also has a book of the same name, 'Upstart' is a literacy specialist. Her book, 'Foundations of Literacy' (Palmer and Bayley, 2013) which although not defined as an academic text, identifies seven strands of practice – learning to listen, time to talk, music, movement and memory, storytime, learning about print, tuning into sound and moving into writing which encapsulate the elements which underpin literacy exactly. The program in this study addresses the same strands but promotes them all through musical activities.

Children's early literacy experiences, knowledge and skills build upon school entry, children arrive with varying levels of each (Tierney et al., 2021). This undoubtedly

accounts for the difficulty of some children to engage successfully with formal literacy learning and others, not so easily. The diagram below illustrates how gaps in early learning will affect literacy progress upon school entry.

Figure 26.

Children's possible array of foundational literacy experience, knowledge and skills upon school entry



Blue = Foundational literacy experience, knowledge and skills
Red = The teaching of formal literacy skills – phonics
Purple = The teaching of formal literacy skills to a child who already has some of these skills
White = Foundational literacy experience, knowledge and skills gap

The diagram illustrates three example children, A, B and C.

Child A has some level of foundational literacy experience, knowledge and/or skills, but upon school entry they are likely to struggle with formal literacy learning as there is a large gap in experience, knowledge and/or skills which would support their learning. This gap for some children can be a chasm.

Child B has foundational knowledge and some skills and experience but not quite enough to give them the best start. They may be able to catch up.

Child C has all the experience, knowledge and skills to enable them to engage effectively with formal literacy learning and has already begun to acquire some of the knowledge and skills that will be taught at school, for example sound to symbol correspondence.

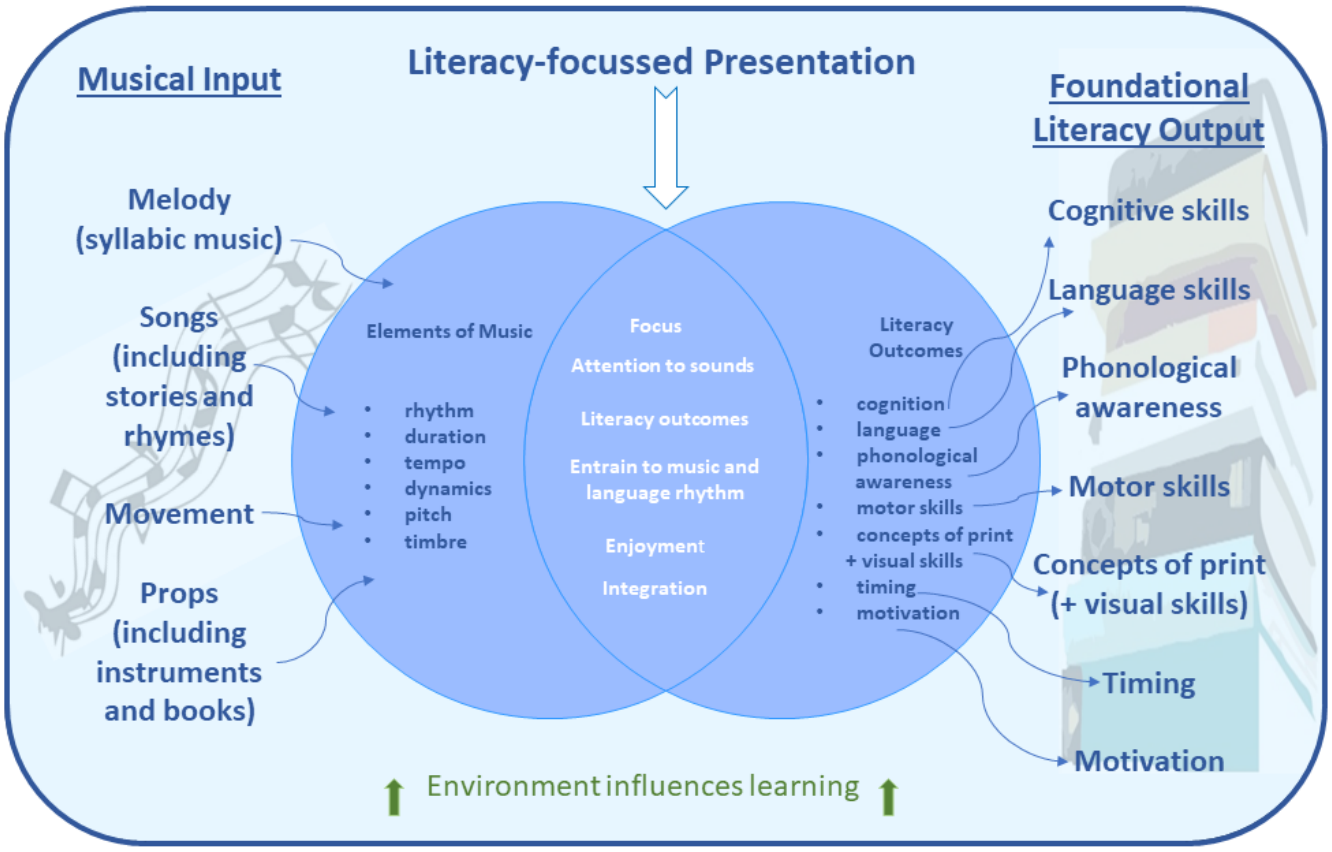
The first teacher in school therefore, must accommodate children who may not have attended any preschool provision and those who have and have not, any foundational experience, knowledge and skills. Some children upon school entry are already able to read and write to some degree, whilst others are a long way from this point. If all children in preschool settings were able to acquire a sound pre-literacy foundation prior to school entry, then they would have a greater chance of success. Additionally, moving the age of formal literacy teaching to age seven years would also help to narrow the gap. The Upstart campaign is driving this proposal in Scotland, but unless the time is filled with appropriate experiences, the time could be wasted. This point is made by Rohde (2015) that simply waiting for a child to develop or lack of direct instruction led to delay. Children must be given time to

develop at their own pace, in a rich and nurturing environment, where they are able to acquire knowledge and skills which will prepare them for life. In this scenario it would still be propitious to implement a literacy-through-music program to help children to acquire the necessary experience, knowledge and skills which would contribute to their literacy and subsequent, overall school success.

Whilst there are various models of literacy learning and models to explain the transfer of skills between music and language there is no model to suggest how musical activities may promote the acquisition of foundational literacy knowledge and skills.

Figure 27.

The Integrated Foundational Literacy-through-Music Model



Maria Kay (2024)

The Integrated Foundational Literacy-through-music Model illustrates the types of activities which have been identified from the data as being most effective at promoting the focus foundational literacy outcomes, the elements of music which can be fostered to promote sound awareness, the underlying mechanisms which account for learning through an integrated music and literacy program and the literacy outcomes and output which are the focus of the intervention.

This model suggests how music and literacy can be integrated by the focus of the teacher on the underlying mechanisms which facilitate the promotion of literacy learning using musical activities as a vehicle for delivery. The literacy outcomes are deliberately reiterated as literacy output to reinforce that what is input, results in output, obviating the need to rely on transference. An alternative way to represent this would be to show music as the vehicle only, however, it is clear that the input of musical activities – music and songs cannot be redressed as literacy. How the music and songs are used accounts for the difference in outcome. The term 'emergent' has been used to illustrate the foundational nature of the developing knowledge and skills which are gradually being built.

Musical Input

Melody Using syllabic music for the melodies supports the embodiment of syllable stress, reinforcing the phonological segmentation of words. Musical phrasing will align with language phrases. The ongoing music will support fluency of action and language production. Adding an introduction and an ending to the music for each

activity offers opportunity for prediction of what is to come next and helps to teach structure. Listening to a melody will also assist with memory recall of the melody from a previous time, which also promotes memory recall of the accompanying lyrics and actions. Recall of a familiar tune which is enjoyable can induce positive emotions.

Songs Singing promotes language listening, comprehension and language production. Singing in a group promotes social cohesion and uplift mood. A teacher can draw attention to the elements of pitch, duration, tempo, dynamics, timbre and rhythm encourage children to use their voices to play with varying the sounds to create varying effects. Repetition of lyrics in songs aids memory and is more enjoyable than learning by rote. Language experience promotes vocabulary and grammatical format.

Movement Movement should be included in the form of action rhymes, songs and stories. Using and encouraging the use of gesture supports spoken language comprehension and production. Activities which involve locomotion in time to music and which are aligned with song lyrics help to promote embodiment and integration of physical rhythm with language rhythm. Repetition of the activities helps to promote motor and muscle memory. Auditory-motor integration supports language development.

Props An array of props will stimulate the children's imaginations, puppets can be used for different voices, claves for tapping rhythms, musical instruments for

practising duration, timing and dynamics; finger puppets encourage role play, and fine motor skills, books can be used to introduce concepts of print, response to visuals and the concept of storytelling.

Elements of Music

Whilst the aim of the program is not to teach music, the basic elements of music help to attune children to sound (Putkinen et al. 2013 found a causal relationship between music and auditory discrimination). Fostering awareness of changes and differences between the sounds in terms of rhythm, duration, tempo, dynamics, pitch and timbre in music will help to attune children's hearing to the same contrasts in language sounds. Awareness of language sounds promotes language comprehension, prosody and use of spoken language in addition to underpinning the ability to attend to the segments of sounds within words.

Underlying mechanisms

Focus Music is attention grabbing, as are props and instruments. which help to focus children's attention to the activities being presented. They add a visual and motor stimulus to the auditory one, provided by music to foster the integration of learning domains.

Attention to sounds The presenter should focus children's attention to sounds both in music and in language. Children become increasingly aware of smaller units

of sound in music in the same way as they become aware of the increasingly smaller sound components in words. In a literacy-through-music program the presenter should, where appropriate, accentuate and exaggerate language sounds, drawing children's attention to the sound structure of words, a strategy which Piasta (2016) confirms will help to foster phonological awareness.

Literacy Outcomes The presenter should focus the activities on the literacy outcomes which will ultimately equip children with the foundational skills necessary for more formal literacy learning.

Entrain to rhythm and beat in both music and language The presenter can model the tapping of a beat in music and songs and encourage the children to tap along, this will promote entrainment. The same can be done with rhythm which in addition to the use of syllabic music and physical movement will promote the awareness of syllables and language timing.

Enjoyment The activities should be enjoyable. The presenter should endeavour to ensure that the activities are appropriate to the children's ages and be relevant to their knowledge and preferences. Their inputs should be valued at all times and they should be given the opportunity to contribute to the choice of activities and any other choices as would be deemed relevant, for example, choosing words to tap out syllables to, or choosing rhyming words to make new lyrics. Activities should be appropriate to the children's culture, language and social environment. Any opportunity to promote humour should be taken. Most activities should involve

movement, actions whilst seated as well as locomotion. Children enjoy repetition which fosters memory retention and recall, and the presenter should be aware and cognisant of favourite activities and note any reasons for this, so that similar activities can be added to the program.

Integration The integration of music and literacy facilitates the possibility of being able to promote all the necessary skills for literacy, explicitly, yet in an enjoyable and social environment where each child can assimilate knowledge and skills at their own level and at their own time. The concept of song naturally integrates music and language; action songs and those involving locomotion naturally integrate music, language and movement. The integration of the learning domains of cognition, language and motor when these activities are undertaken together stimulates both hemispheres of the brain and impacts positively on language skills. However, to impact the areas which underpin successful literacy, an intervention should target more than language skills only, such as phonological awareness and concepts of print, and the integration of these through music provides a natural and enjoyable experience through which to explicitly teach the skills. Integration supports learning, as engaging various areas of the brain simultaneously enables greater connections to be made, which subsequently supports memory retention and recall. When music and story-telling are integrated for example, attention can be heightened and Register et al., (2007) reported significant gains in reading comprehension with such integration. When music and literacy learning are integrated, activities are more enjoyable and more attention grabbing than literacy activities alone and the use of props further engages interest and leads to greater embedding of skills.

Literacy Outcomes and Literacy Output

The re-iteration of the literacy outcomes as both outcomes and output, serves to emphasise that what is taught is what is learnt. When children undertake a music program, they learn musical skills. This program is a literacy program, focus on literacy outcomes leads to literacy output. To avoid repetition here of the skills required, only a brief summary is necessary.

Cognition 1 The promotion of the skills of comprehension in terms of comprehension other than that of language, for example, cause and effect or understanding the feelings of others and the ability to understand concepts (such as left and right) and how these might be applied, for example, in this case, to the body or direction of travel. 2 The ability to focus, concentrate and pay attention to a current learning situation or an event in the environment. 3 The ability to comprehend and continue a sequence of pattern or timed events and to use this information to predict what is to follow. The consistent performance of beginning and ending activities in the sessions and using introductory and final musical endings to songs helps to nurture this skill. As children learn more about life in general this helps them to anticipate possible consequences; this can be fostered through story-telling such as is embedded in musical stories and rhymes. 4 Rapid automatised naming was not a skill which was promoted particularly in the sessions but could be incorporated by the use of visuals if a teacher was particularly inventive. 5 Memory is important for all domains, auditory, visual, motor, language and emotional. As learning is assimilated through the senses, repetition helps to

foster memory retention and recall as they are all inter-related. Music further helps to embed memory.

Language Spoken language is critical to literacy success as written language is predicated upon spoken language. The strong relationship between music and language has been explained and the possibility of transference of skills from music to language, further exemplified. There is no doubt that musical activities can promote both receptive and productive language. Vocabulary can be taught through matching visuals and actions to language, which help both comprehension and memory retention. Awareness of prosody can be easily promoted through musical experiences as music has the same prosodic elements as language, of intonation, rhythm and stress. Children who can tap a beat in time to music and are sensitive to the rhythmic units in speech learn to read and write more easily than those who are not (Kraus, 2022). Rhythm in speech also indicates what is to follow and helps language comprehension and ultimately, reading comprehension. Keeping time with a musical rhythm also promotes fluency and can help with speech impediments and again, ultimately reading fluency. Singing and reciting rhymes is recommended by Di Liberto et al. (2023) who found that babies' response to IDL and rhymes promoted their language learning. The fifty babies in the study did not detect small linguistic units (tested at four, seven and eleven months of age) until seven months old and relied on the rhythm in language to recognise words. This highlighted the importance of rhythm to language learning.

Phonological Awareness is the main predictor of reading proficiency, after language, with phonemic awareness being the strongest predictor from the three levels of syllable, rhyme and phoneme. The ability to attend to sounds in music can form a basis for the ability to attend to language sounds.

Goswami (2006) explained that phonemes are not basic speech units prior to literacy, unlike syllables and rhymes, and that consequently, phonemic awareness is most likely to develop with the onset of letter learning. The learning of syllabic segmentation of words is easily promoted by modelling by the presenter and practise of tapping out syllables. Offering ample opportunities for the matching and generating of rhymes though the recitation of rhymes and emphasising of rhyming endings helps children to become aware of these ending patterns in words and syllables. Awareness of rhyme also fosters phonemic awareness, as when a rhyme is taken from a word, its onset remains; quite often this onset is a phoneme. Playing with exchanging rhyming endings can therefore help in the identification of phonemes. Similarly, alphabet songs and ones to promote initial letters sound will help to promote phonemic awareness.

Motor skills Gross motor skills require whole body movement, they strengthen the body core and balance and promote awareness of space. Many songs in the program in this study (A6, 7, 15, 16, 26, 32, 34, 39 and 46) required children to move in a variety of ways across and in space. Cognitive, auditory and motor skills are required for these activities and the ability to move in time to a given beat or on

a given cue. This requires the ability to follow an auditory pattern. The link between sound perception and movement is also required in reading.

Fine motor skills were promoted in this program through the use of finger puppets, manipulation of instruments and bricks. As with gross motor skills the participants were required to perform in time -but this time also controlling the manipulatives - with auditory cues and could also vocalise at the same time. Control of manipulatives is one skill required for writing, but writing also requires the simultaneous generation internally of spoken language whilst also recalling sound to symbol correspondences for the spelling of words and applying any knowledge also that the spelling is correct. Spelling not only requires phoneme to grapheme correspondence but also knowledge of irregular spelling patterns. This cognitive load can be reduced if writers are already adept at some of the requirements. For example, if a child can speak fluently, has no problem in forming letters or has a good knowledge of phoneme-grapheme correspondence, then the brain can focus on preferences for word choice or sentence construction and can produce writing more quickly and fluently than a child who struggles in all these areas.

Concepts of Print An understanding that print has meaning and that writing differs from pictures or numbers is a vital step to decoding text. Reading and demonstrating books in an integrated literacy-through-music session can help to illustrate how books are used and can help to engender a sense of pleasure from book reading. By regularly seeing books being used, children will learn that words are separate parts of sentences as they can see the physical spaces as words are

being read. They learn how books are handled and print direction. Any accompanying pictures in books help to promote language comprehension and help to foster imagination. The importance of visual skills has been previously explained and the inter-relatedness and harnessing of all domains and skills together is what leads to literacy success.

Timing Overlapping neural mechanisms between rhythm and literacy seem to account for the correlation between the ability to synchonise to a beat and reading ability according to Bonacina et al., (2021). In a presentation at the Visionary Conference in San Diego in 2017, Kraus explained that children who are able to synchronise their movements to a beat have a more stable response to sound and can pair sound and meaning and sound and movement. This subsequently impacts upon language and ultimately reading skills. Conversely, poor readers tend to demonstrate poor distinction of speech sounds. As making music requires precision in performance of auditory and temporal skills such as attention to pitch and rhythm changes, participation in musical performance helps to hone skills which are essential to language and literacy competence. Furthermore, making sounds can stimulate the reward system (Kraus, 2017; Fiveash, 2023) which facilitates the making of an increasing number of neural connections. This helps to explain why the integration of the skills related to music, language and movement have a such a powerful influence on literacy.

The program in this intervention provided many opportunities for the participants to develop timing skills. Most of the activities consisted of ones in which the beat of

the music or stress on spoken syllables was emphasised by the presenter. The children were encouraged to follow this example, either by clapping, tapping claves, playing instruments or moving their bodies in time with the music and song lyrics and similarly using prosody in music and spoken language to add emphasis.

Literacy-focussed presentation The role of the presenter has been explained and is pivotal to the success of a literacy-through-music session. For example, merely singing songs or playing a CD, whilst admirable pursuits, will not engender literacy skill promotion in the way that asking children to generate a word that rhymes with, ‘fling’ for example and subsequently using this word in altered song lyrics will. The ability of a presenter to utilise children’s contributions adds greatly to both learning and enjoyment and the presenter should be ever cognisant of the skills they are aiming to promote.

Environment Ultimately, the environment should be one that is conducive to learning, it should be social, relaxed and offer joyous activities. Activities should be culturally sensitive and include opportunities for celebrations for all religious denominations at appropriate times. The physical environment should be comfortable and any visual stimuli that would enrich the sessions should be displayed. For example, it may be useful to display numbers, colours, letters of the alphabet or any visual which is relevant, such as one relating to a weekly theme, and which could also be incorporated into the activities. The introduction of instruments, props and books can serve to ‘literacy-enrich’ the environment and can be used as a source for discussion and the learning of new vocabulary.

CHAPTER SEVEN – CONCLUSION

7.1 Summary

Literacy is always high on the world agenda with reports of falling standards (NAEP, 2022, WLF, 2023) causing concern. The ‘Reading Wars’ about the best methods of teaching children to read persist. Children continue to struggle despite the changing teaching methods. The years which are the most formative, up to the age of seven years are often overlooked, yet, research confirms that these early years are those upon which the foundations for the future are laid. Practitioners in early years settings are generally, not trained, qualified or paid as well as schoolteachers. The Matthew Effect is evident in education. It behoves early years settings to offer the best opportunities for lifelong success by hosting learning environments which foster care, holistic development and include literacy-rich resources and literacy-trained professionals to give children the best possible start upon school entry. There are also teachers of reading who have not been taught how children learn to read and write and would no doubt benefit from additional training. There is little to help early years practitioners to understand how music and literacy may be conflated to promote foundational literacy skills. Arasomwan and Mashiy (2021:abstract) states that ‘*there is insufficient training in how to use music-based pedagogies, lack of musical resources and non-inclusion of music-based pedagogies in pre-service teachers’ curricula and ECCE curricula’.* All early years teaching institutions should include literacy teacher training, and in view of this research, how to integrate music to support literacy learning, yet they fail to do so.

Literacy research tends to be directed to the formal teaching of literacy upon school entry and less upon the necessary foundations which need to be in place to support this formal learning. There is a misconception that this is where the ‘real’ learning begins. There is also a gap in qualitative research in the area of literacy, as a pervasive feeling exists that it is in some way epistemologically less reliable to the logic and numerical base of quantitative studies, a point discussed by Dillon (2005) and reiterated by Mirhosseini (2017) who stated that qualitative research continues to be of lower visibility in the area of language and of literacy education. This research therefore aims to address this marginalisation of qualitative studies and the importance of the building of strong foundations for literacy learning upon school entry.

Literacy models such as, The Reading Rope (Scarborough, 2001) and The Active View of Reading (Duke and Cartwright, 2021) identify various skills and experiences necessary to support literacy success; these aim to help teachers of reading instruction. They are concerned with the process of learning to read, rather than the precursors to reading and writing. The Comprehensive Emergent Literacy Model (Rohde, 2015) addresses more of the foundational areas but does not refer to the importance of motor skills or prosody in language including the all-important attention to the rhythmic features of language.

Dehaene (2009) in his book on how the brain processes text, refers to the pre-school period as a preparatory stage and the term ‘emergent literacy’ refers to this stage but also extends until children are independent readers. The researcher has

therefore used the term ‘foundational literacy’ in this research, to refer not to the stage but to identify the knowledge, experience and skills which will bolster formal literacy learning when children begin to match phonemes to graphemes in school. It is also acknowledged that there are some children who surpass expectations at this preparatory stage prior to school entry and possess all the foundational competences necessary for them to be successful readers and writers.

Formal literacy teaching begins according to a child’s age and not stage. Hence there is a gap for some children upon school entry when they begin formal literacy learning when they are not yet at a place on the learning continuum where they would most benefit from formal instruction. The children who are equipped with the knowledge and skills to benefit most and have had sufficient experience to learn about text, its purpose and the concepts of print and will learn to read and write most effectively, whilst the children with little experience, knowledge and skills may struggle and may never catch up. The children at greatest risk of risk of poor language and literacy development are those from the most deprived areas (Scottish Government, 2010). This research was undertaken in an area of social deprivation, situated in Scotland.

A literature review was conducted to establish the competencies of children who are good at literacy and to compare these to the lack of competencies in children who struggle. The findings showed that these were the same and are illustrated in Figure 2. The major areas were as expected, cognition, language and phonological awareness, and as literacy is predicated upon language, this is a major target area,

but also identified were the importance of movement, the ability to synchronise to a beat, awareness of rhythm, and motivation. Additionally, the environment plays a contributory role in a child's literacy development as children learn from their environment and the people within it.

Evidence was also garnered on the importance of the early years. The age of three to five years was identified as one in which the brain is highly plastic and where interventions can have the greatest impact. Thus, children between these ages were chosen for the study.

Having identified the underlying components of literacy success and also when in deficit, of literacy failure, the researcher considered evidence of where musical experience has been shown to positively impact these areas and specifically in young children. There is a wealth of research evidence attesting to the benefits of undertaking musical activities, and much of this has found correlation between music and language, and music and literacy outcomes (listed on pages 348-349). Additionally, it has been suggested that making music could partially offset some of the negative impacts of linguistic deprivation (Slater et al., 2014; Bonacina et al., 2018), which would be particularly useful in an area of social deprivation, such as the one in this study.

Although there is a wealth of correlational evidence to support the positive impact of musical experience upon literacy outcomes for example, Fisher, (2001), Anvari et al., (2002), Peynircioglu, et al., (2002), Register, et al., (2007), Bolduc, 2009,

Schiffmacher, (2009), Zuk et al., (2013), Forgeard et al., (2008) and Bonacina et al., (2021), there is no causal evidence that musical experiences can promote literacy skill development. There is, however, little doubt that some of the skills required for literacy can transfer or be built upon from those developed through musical experience.

Whilst there is ever-growing evidence of the positive impact of musical experience upon literacy, teaching musical skills does not teach children to read and write. Despite Butzlaff's assertion of this in 2000, music and auditory interventions continue to be examined with a view to improving reading. For example, Cancer and Antonietti (2022) conducted a literature review and confirmed the hypothesis of an existing transfer effect between these interventions and positive effects on phonological and literacy skills in children with reading difficulties and Pino et al. (2023) confirm from their 'State of the art literature review', that music plays a critical role in the comprehension of language development in early life.

The only causal evidence in relation to musical impact upon literacy is that of musical experience benefitting the promotion of auditory discrimination (Putkinen et al., 2013). Auditory discrimination is pivotal to the ability to discriminate language sounds, and as phonemic awareness is the strongest indicator of literacy success then it is unsurprising that musical experience can indirectly have a causal relationship with this aspect of literacy competence.

The close relationship between music and language is explained by the many areas of commonality. Patel, (2009) and Tierney and Kraus, (2014) offer hypotheses to explain the transference of musical to language skills. Whilst of vital importance to literacy, language skills are not alone in underpinning literacy success and areas which may be conflated to promote literacy skills are identified in Figure 5 (page 156).

Findings from the literature review on the benefits of musical experience to literacy, indicated that musical experience was correlated with many literacy outcomes. The closer music and literacy are brought together the closer the correlation between them. Where music and literacy outcomes were deliberately combined in studies, then these reported the greatest benefits to literacy, for example, Standley and Hughes' study in 1997, Register in 2001, Register et al, in 2007 and Verney in 2011.

Bolduc and Lefebvre (2012) suggested that explicit instruction on desired outcomes would offer the best outcome and they found that supplementing nursery rhymes with language activities and music was more powerful than rhymes alone and boosted phonological awareness. They suggested that more research was needed in this area, as did Rautenberg 2015. Pauls (2012) noted that research tended to come from musical educators rather than literacy ones, and that this area of work would benefit from researchers with language and reading expertise. She specifically suggested more research to determine the type of program which would most effectively support the development of literacy skills. Other gaps in the literature were unveiled by the literature review – lack of causal evidence of musical

experience to literacy, the impact of implicit instruction of literacy skills through a musical vehicle and a lack of qualitative research on language and literacy learning.

Three main questions were raised:

- 1 How can an integrated music and literacy program be designed so as to promote the acquisition of required foundational literacy skills?
- 2 Can an integrated program be shown to promote foundational literacy skills?
- 3 Can any underlying mechanisms be identified to which attainment of literacy outcomes could be attributed?

These gave rise to further questions:

- 4 How did the presentation of the program differ from a music program?
- 5 Did the presenter exhibit any particularly good or poor practices?
- 6 Which activities were most effective at promoting literacy outcomes and why?
- 7 Was there any evidence of improvement in sound awareness?
- 8 How did children respond to the program?
- 9 Were there any negative outcomes of the program?
- 10 Would it be possible to identify children at potential risk of literacy failure through the program?

- 11 Were there any other observable outcomes other than the focus skills and literacy competencies?
- 12 Could the program be considered worthwhile?

This research therefore aimed to address these questions and gaps in the literature by the conflation of music and literacy from a literacy perspective and the undertaking of a qualitative intervention which would serve to inform early years practitioners how best to use a musical vehicle to promote foundational literacy outcomes and to further the understanding of this process. This would subsequently offer a bridge between research and practice.

Verney, (2011), Fisher, (2001) and Moyeda et al, (2006) believed that where music is found to benefit literacy outcomes, it is not the music 'per se' that accounts for the benefits of music to literacy, but the intervention itself and the combination of music and literacy together; in effect, the synergy of the two which creates maximum impact upon literacy learning. A program was thus devised using the 'embedded-explicit' model of research design (Justice and Kaderavek, 2004) using a constructivist approach, with the foundational literacy skills identified from the literature review as learning outcomes. To answer the first research question, the program was designed to promote literacy skills through a musical vehicle. Syllabic music was recorded to support the activities in the program and appropriate activities chosen which could be used to promote foundational literacy skills.

Whilst literacy models such as the Active View of Reading (Duke and Cartwright, 2021) and The Comprehensive Emergent Literacy Model (Rohde, 2015) do not include movement and rhythm, findings from the literature review (Petrigna et al., 2022) indicated that movement is important to early childhood learning as it stimulates the brain and with music, also the reward system (Fiveash et al., 2023) in addition to supporting language learning (Novak and Goldin-Meadow, 2015) and that the ability to synchronise to a rhythm is an important predictor of PA, auditory short-term memory, RAN, musical rhythm discrimination, language comprehension (Bonacina et al., 2021) and language learning (Di Liberto, 2023). Movement and rhythm were therefore incorporated into the program design and a planned delivery of 30–40-minute, daily sessions over a duration of six weeks, through integrated music and literacy activities. This would obviate the need for transference of skills from music to literacy and hence the need for data to show causality. The presenter of the program would explicitly seek to promote literacy outcomes.

With the permission and support of the Centre Head and in accordance with SERA guidelines, the Centre Head provided a random sample of nine children aged $\overline{X}$ = 4 years and 4 months, and the program was delivered. The sessions were recorded on video by child volunteer, videographers who were provided by the adjoining primary school. A qualitative, observational study was chosen as one which would best allow the researcher to address the questions raised and was implemented in the natural setting of the children’s early years centre as part of their daily routine.

A selection of the recorded videos was identified, in order to offer an overview of the sessions and ensure inclusion of all participants and a maximum number of activities and these videos were subsequently transcripted to extract as unbiased view as possible. It was not possible in the timeframe available to transcribe all the video footage collected. The transcripts were then coded to highlight occasions which showed evidence of literacy skill performance. This enabled the researcher to note performance over time of the literacy outcomes and to identify the activities which evidenced most literacy skill performance. Further coding enabled the researcher to identify possible underlying mechanisms which may have accounted for the promotion of the literacy skills through the musical activities.

The data collected provided a rich source of information from which to answer the research questions. Initially, the researcher was able to build a ‘literacy profile’ for each participant through deductive coding, to illustrate the literacy skill acquisition over time. This showed with the exception of one participant who possessed all the competencies at the beginning of the program, how the competencies of each participant progressed over the course of the program. All participants progressed to varying degrees. This answered the second question as to whether such a program could lead to the acquisition of literacy skills. Not only were the participants observed to be acquiring skills which would support literacy learning, but they were also observed to be able to integrate and apply these skills. Each participant gradually acquired knowledge and skills at varying rates. Some participants may have acquired skills but did not outwardly demonstrate them; it was not therefore possible to observe non demonstrated competences, this would have required

some form of assessment. Assessment was not part of the program as the researcher aimed only to gain information by observation, as she did not wish to place any pressure on children to perform.

Further investigation to answer the third question sought to identify the mechanisms which may underlie the effectiveness of the literacy-through-music program. These were ascertained through iterative coding of the data to identify repeated themes from the activities where participants were shown to be acquiring the literacy outcomes. The mechanisms identified were: 1 - the ability of participants to focus on the activity and presenter, an area identified initially as a cognitive skill indicative of literacy proficiency; 2 - the ability of the participants to pay attention to and focus upon variations in sound, this applied to both musical and language sounds; 3 – the focus of the activities and of the presenter upon achieving literacy outcomes, as determined in Figure 2, 4 – the ability of the participants to entrain to a beat and the rhythm in music and ultimately in language (syllables); 5 – the nature of the activities to be enjoyable and engaging for the participants and ultimately 6 – the nature of the activities to be integrative in terms of engaging auditory, visual, language and motor mechanisms and often simultaneously. The use of music facilitated this integration, and the multifarious activities encouraged the embodiment of learning from the presenter and other adults, the tools, the environment and other participants.

For children to be able to read and write, they must be able to engage multiple domains simultaneously. Performing musically, changes the brain (Kraus and

Chandrasekaran, 2010; Kraus, 2019; Degé, 2021) by exciting an increased number of dentrites. This subsequently enables the synapses to transmit electrical signals to the brain. Increased brain activity creates new cells and between the ages of six- and seven-years synapses which are unused are ‘pruned’; it is therefore propitious to stimulate the brain as much as possible in these formative years.

To answer question four, the differences between a music program and an integrated literacy-through-music program were tabulated in Figure 20 on page 292. Primarily, the difference was due to the difference in learning outcomes, as the outcomes of the literacy-through-music program were literacy ones as opposed to musicality in a music program. There was a difference also in the presentation of the program as the presenter was a literacy specialist rather than a music specialist, although she had a little musical background and was able to promote musical skills and relate them to language outcomes, such as emphasising the language aspect of musical elements, for example, the rhythm in language and the use of pitch, duration, dynamics, tempo and timbre to draw attention to prosody in language. The presenter was able to draw attention to the individual sounds in words, for example asking whose name began with the sound /l/ for example. The presenter asked questions to elicit evidence of skills and to ensure inclusion of all participants. The participants were also involved to some extent in the content of the program, being asked to generate words to syllabify and their preference of activities.

Whilst not wishing to be repetitive, but to answer question five, a few of the best practices of the presenter are highlighted here. The use of introductions to the

beginning of activities, both verbally and through the use of music and actions, gave the participants processing time to prepare mentally and physically, for listening and possible action; it helped them to predict what was to come. She sometimes also practised an activity first without the music so that the language could be clarified and practised without the need to keep up with the music. The presenter used gestures to support her instructions and modelled the behaviour she wished to promote. The presenter scaffolded in various ways, for the group, gradually reducing instructions and individually working with the participants on a task until they became independent. She drew participants' attention to links between activities. She used oral cloze and repetition, as strategies to promote memory and participation and gave agency to the participants in the form of activity choices and within parts of activities to enhance inclusiveness. The presenter listened and responded to the participants' contributions and praised their efforts.

The activities which were most effective at promoting literacy outcomes were the ones with which the participants had the highest engagement. This was observed to be due to enjoyment of the activities. Enjoyment was observed when the activities included a selection of movement, props and/or instruments; when the participants were easily able to join in, due to the repetitive nature of the activity and which therefore made it easy to remember, and where time was given for participants' responses; humour was a factor which increased enjoyment, particularly where participants were able to make loud sounds, either verbally or with instruments, and also where the activity was relevant to the participants, either through familiarity of

content or specific inclusion of the participants or where they could feel to have agency over the activity choice.

The seventh question refers to the ability to become attuned to sounds. Music is a natural promoter of this ability and also of the ability to perceive sounds in a noisy environment and ‘speech-in-noise’ (Slater et al., 2015). When lyrics are added to music, the listener must tune in to both the melody and lyrics simultaneously, a natural integration. Participants in the study were observed to become increasingly aware of the myriad of sounds being produced and how to produce them themselves, perceiving variations in rhythm, duration, tempo, dynamics, pitch and timbre. The participants were observed to become increasingly aware of the sounds within words, as this was facilitated by the presenter and supported by the use of music.

The ability to attend to language sounds is of paramount importance to being able to comprehend and use language and to learn to read and write. Language is a combination of sounds which give meaning. Small variations in sounds such as /a/ or /e/ change the meanings of a word, ‘bat’ or ‘bet’. This accounts for difficulty in understanding different accents, which sometimes also have differing sound duration and emphasis. Exposure to language and practise, increases the ability to understand and use it. This program offered a wealth of opportunity for the participants to practise listening, producing and moving to the rhythms in language sounds. Their attention was drawn to the prosodic features in the language, not least to the rhythms, which supported comprehension.

The primary role of music in literacy skill promotion, is to attune a child's ear to sound. If children are able to discriminate musical sounds, then this will help them to discriminate language sounds (phonemes) as they will be able to detect variations in sound, thereby helping to differentiate between 'bat' and 'bet' for example.

In answer to question eight, the participants responded well to the program. They were quiet initially, not knowing what was expected, but joined in as soon as they were able, as the instructions were clear and the activities were engaging and enjoyable. Tasks were revisited over time at increasing levels of complexity in accordance with Bruner's spiral curriculum. For example, listening, then listening and action, then listening, actions and vocalisation; or interposing one word at the end of verse, then at the end of lines, then multiple words, building to the ability to sing whole verses and songs. The participants began to integrate these behaviours, indicating increasing awareness of sounds, timing, memory and ability to perform these skills simultaneously. Participants were able to engage with the activities from the first session and did so, increasing their abilities at their own pace over the duration of the sessions. The participants particularly enjoyed activities which involved props and movement, those which stimulated their imaginations, involved humour, were repetitive and which they saw as being relevant to them and their lives. Enjoyment increased levels of engagement, which subsequently impacted upon memory retention and recall and the acquisition of skills. The music doubtless, as evidenced by previous research, contributed to enjoyment, facilitated fluency of

performance and prediction, and stimulated the engagement and integration of auditory, motor and visual memory, learning domains, and both brain hemispheres.

The only negative outcome perceived from the program would be that of opportunity cost. Whilst the participants were engaged in the program, they were not engaged in the activities being undertaken by the rest of their class. It is hoped that the gains being made in the literacy-through-music program were sufficient to warrant removal from the usual class.

To answer the next question, number ten, it is believed that according to the data collected it was possible to identify participants who were at possible risk of literacy failure and also to identify the specific skills which would need to be targeted. Possible indicators for struggling students would be lack of:

- spatial awareness
- sound awareness and ability to discriminate between sounds
- physical balance/motor skills/co-ordination
- speech/pronunciation
- timing – ability to keep a beat
- phonological awareness and
- cognition

These areas were identifiable through the activities in the program. Where participants were seen to be particularly weak in the performance of motor skills,

co-ordination of language and movement or music and movement and/or did not cross the midline for example, then this could have been a sign of a participant being ‘at-risk’. According to Richmond and Marks (2019:1) *’Midline crossing was found to be essential for the development of hand preference, ability to form letters, and necessary for travelling into hemispaces required for handwriting*’. The inability to cross the midline indicates that both hemispheres of the brain are not working together; this is also indicated when a child does not show a preference for left or right hand by the age of six years. Activities which encourage this crossing, enhance co-ordination and learning. The ability to track visually across a page is also essential to reading and writing; any activities which help to strengthen these abilities contribute to literacy competence and ultimately reduce cognitive load once formal learning begins.

Carson et al. (2013) suggested that using a musical program to promote early literacy skills, such as PA, could help to minimise the number of ‘at-risk’ children if the program was implemented before the age of six years. The evidence from this research would lead the researcher to accord with this suggestion.

An unexpected observation from the data was that some participants were seen to be engaging in volitional rehearsal. This was viewed by the researcher, as a positive outcome, as the participants were repeating activities to themselves. It can be assumed that the activities were enjoyed if the participants were choosing to re-enact them. Also, such re-enactment would serve as practise and further support the promotion of the focus skills. Finger or hand sucking and gesturing were other

unexpected behaviours, which may be suggestive of immaturity. Finger sucking is a self-soothing behaviour which usually desists at around the age of three years, but may continue up to six years. Gesturing supports language comprehension and production and is often observed alongside vocalisations. On some occasions however, participants were seen to be gesturing only, with no accompanying vocalisation. In future research, this behaviour could be more closely studied to ascertain its possible cause or future effect.

A further observation was in relation to the duration of the program. All participants were observed to be improving in the focus competencies. However, as well as being encouraged to perform vocalisations and actions at specific times in the activities they were also encouraged to recognise and synchronise their movements to musical beats, a skill which is correlated with phonological skills (Goswami, 2011). It was noted that some participants seemed to naturally entrain to a beat, others were beginning to be able to keep a beat and others were not. It is possible that over an extended amount of time, this skill could possibly have been acquired by further repetition and practice.

The literacy-through-music program designed and delivered in this study was considered by the researcher to be a worthwhile program, answering question twelve, for the following reasons:

- The participants gained in literacy competencies throughout the program; the one participant who already possessed all the competencies at the beginning

of the program was able to apply, practise and hone her skills and was able of her own volition to support others.

- The program offered opportunities for the participants to integrate their competencies, both of previous learning and new.

- The program facilitated embodied learning, whereby participants were able to enjoy multi-sensory experiences through which learning was able take place.

- The activities were enjoyable, therefore engaging and therefore motivational, which led to an increased propensity for learning to take place.

- The program offered opportunities for the lesser acknowledged contributors to literacy of motor skills and the ability to synchronise to a beat to be acquired and improved.

- The program was one of comfort and set in familiar surroundings for the participants; the music added to the informal nature of the intervention without any pressure being put upon the participants.

- There are other areas in early years settings through which many of the literacy competences identified, may be promoted, for example, balance and locomotion through PE activities, language and rhyme in a language/literacy

session and drumming and timing in a music session. However, an integrated literacy-through-music program conflates all skills and facilitates the integration of them, maximising the engagement of the brain.

- The program enabled the Integrated Foundational Literacy-through music model to be developed (see page 371).

Engaging in musical activities effects numerous benefits to the participant. Many of these benefits are alluded to in the list on pages 354-355 and these benefits may further help to re-inforce literacy learning. The use of music as a conduit for learning is much acclaimed, due to its nature to promote enjoyment, social skills, movement, auditory and cognitive stimulation. Furthermore, its close relationship with language renders it the perfect partner for forging language related skills; it helps the listener to focus upon and differentiate sounds which is a vital skill for receptive and productive language, especially the recognition of the use of prosody. There is a wealth or correlational evidence attesting to the relationship between musical experience and phonological awareness (Anvari et al., 2001; Bostelman, 2008; Bolduc, 2009; Bolduc and Lefebvre, 2012; Degé and Schwarzer, 2011; Hunt, 2012; Lathroum, 2011; Patscheke et al, 2016; Sousa et al., 2022; Steinbrink et al., 2019; Tierney and Kraus, 2014 and Verney, 2011). Although skills acquired through music may transfer to literacy learning, this research shows that deliberately and explicitly targeting literacy skills using music as a conduit for delivery is not reliant upon transfer. Music is also motivational and can be used alongside visual stimuli to elicit responses from pictures and text. Other than for people suffering from amusia, a

condition which renders music to be perceived as an unpleasant crashing, cacophony of sound (Sacks, 2008), most people find music to be a pleasant experience, dependent upon their musical preferences. Music also offers a holistic way of learning and assumes the inter-relatedness of all areas and helps children to make connections between them.

7.2 Contribution

Whilst other research has identified individual correlation between specific musical skills and specific literacy skills, this research investigated how music could be instrumental in helping to promote all the skills pre-requisite to literacy when music and literacy learning are integrated such that the focus is upon foundational literacy outcomes, and the vehicle for delivery is musical. Such a program also offers the opportunity for the practise and strengthening of these pre-requisite competencies and would be useful for all pre-school children, not only those needing to acquire them. Children starting school are on an emergent literacy continuum and to bolster their learning in essential areas prior to formal school entry would help to narrow or close the gap for some children who would otherwise maybe never catch up.

This research also addressed the gap in the literature in terms of providing a qualitative research enquiry into the promotion of foundational literacy skills prior to school entry, without the necessity for assessment. It was administered from a literacy perspective, contrary to many other studies which view literacy through a musical lens. It offers a bridge for practitioners between research and practice,

being a practical intervention delivered in a natural setting, in contrast to an experimental enquiry in a laboratory. It is realistic, in that the activities are naturally integrative and the expectations for the participants are that they will integrate their learning and that learning will be embodied from the multi-sensory stimuli, and interactions with adults and peers.

This research has congruence with theory on emergent literacy, in the belief that learning is a continuum and that children need to acquire knowledge and skills in a way that is pertinent to them and their experiences. Although the presenter delivered explicit instruction and was cognisant of the literacy focus, from the perspective of the participants, the activities afforded them time to play with puppets, instruments and language. The play was guided play, as opposed to free play, but nonetheless, was playful. Importantly, the activities offered opportunity to learn through moving, integrating language, music and movement in a relaxed, natural and enjoyable environment.

Whilst most literacy-related research generally addresses factors which will inform reading instruction, this research addresses the stage prior to formal literacy, the emergent literacy stage (Clay, 1966; Rohde, 2015) or preparatory stage (Dehaene, 2009) by identifying foundational competencies which underpin literacy success, and which are found to be deficient in those who struggle with literacy learning. This research subsequently identifies how a literacy program may be devised to promote these competencies through the medium of music, which itself confers many benefits upon learning. Additionally, previous literacy models (Scarborough, 2001,

Duke and Cartwright, 2021 and Rohde, 2015 for example) do not recognise the importance of motor skills, those of rhythm and timing (important aspects of prosody, and language comprehension and production) and the fact that children need to be able to integrate these competencies simultaneously and apply them to a task (for example, retaining and recalling song lyrics and actions in order to reproduce them). Practise in conflating auditory, motor, cognitive and language skills helps to engage multiple learning domains and areas of the brain, thus stimulating synapses and improving the brain's capacity to learn.

The findings of the study suggested that the use of music makes a difference, because it offers an introduction, a time to get ready where children are paying attention to the sound and entraining themselves to the beat and internalising the words, ready to begin. It also offers a winding down time as the lyrics finish and the music continues to draw a conclusion to the activity. Using music brings all faculties together, thus maximising engagement of the brain and the simultaneous use of learning domains. It promotes the ability to keep a beat and ultimately fluency through entrainment. It is therefore superior to an intervention which, for example, may only target rhyming skills or the ability to tap a beat on its own. The intervention was inclusive and allowed each participant to engage at their own level and pace.

The findings from the data suggested that congruent with other studies:

- The music added to the enjoyment of the activities, the enjoyment of the activities fostered engagement and the activities in which the participants

actively engaged were the ones in which they gained most skills and knowledge.

- The use of musical instruments enabled the participants to build find motor skills and fostered the ability to play in time.

- The music facilitated memory retention, this was evidenced by participants who, upon hearing the music, began to perform the activity.

- Music helped the participants to move their bodies in time to a beat and in time to voiced language, thus embedding vocabulary and timing in language; also to entrain to a beat using claves.

- The use of music facilitated listening skills and participants' awareness of sound.

- Children learn what is in front of them, if they are explicitly taught literacy skills then they are more likely to acquire them than if they are not explicitly taught.

Original contributions of this research suggest that -

- using syllabic music helps children to detect syllables in language when music and language are conflated

- a literacy-through-music program can promote the acquisition of foundational literacy skills when the program is designed to explicitly elicit foundational literacy outcomes and when the presenter focusses on literacy outcomes.

- it is possible to see, through a literacy-through-music program, how language becomes embodied through the use of music and movement. For example, in the situation when a participant, listening to the melody and lyrics of a song, whilst observing a visual stimulus, shouted, '*splash*' and jumped at the same time and at the right time in the song. This has implications for the use of integrated activities to foster the integration of focus skills.

- a literacy-through-music program could be used to identify children at risk of literacy failure

- the research highlighted underlying mechanisms for the success of a literacy-through-music program.

Original features of the research were that -

- the research was undertaken from a literacy perspective.

- the research was of qualitative design, which is unusual in this area of research into music and literacy.

- an integrated foundational literacy-through-music model was developed.

7.3 Implications

The implications of this study are that using music for the forging of literacy skill acquisition, via the integration of both music and literacy outcomes, has a wealth of positive benefits. The research findings support previous evidence of a wide array of auspicious features of music, which help to foster learning and the areas of commonality between music and language, and subsequently language and literacy, render an integrated intervention to be an excellent literacy learning medium.

There is currently a mismatch between theory and practice in early years and a need to upskill practitioners so that they are up-to-date with the latest theoretical findings. For example, although ‘music’ is specified as part of the curriculum (Scottish Government, 2017d) it is not specifically related to language, other than suggesting that a practitioner makes use of songs and rhymes. This could consist of the playing of a CD and children listening and singing along, which would not confer the same benefits as the activities in this study. Possessing knowledge and how and why music can be used to foster literacy learning would be advantageous to early years practitioners.

Whilst implementing a literacy-through-music intervention it is possible to identify children who may be ‘at-risk’ and who are demonstrating weaknesses in some

areas; this would afford time before formal school entry to work on strengthening any problem areas in order to ameliorate possible future difficulties.

In addition to promoting skill acquisition and identifying areas of weakness, a literacy-through-music program can also be used to strengthen existing skills and offers an opportunity to practise, apply and integrate skills acquired.

The research findings also have implications for the training and pedagogical practice of early years practitioners in the fostering of early literacy foundations. It also has implications for speech and language therapists who currently are not trained to use music as a strategy to support language development.

Ultimately, the need for transference of skills from musical experience to literacy learning is obviated when music and literacy are integrated. The benefits of undertaking musical activities are additional and complementary to the literacy learning.

7.4 Recommendations

As Bolduc and Lefebvre (2012:500) encouraged preschool teachers to '*to go beyond the recitation of nursery rhymes'* by adding language activities to enrich the learning context, the findings of this research encourage preschool teachers to '*go beyond the singing of songs, rhymes and stories'* and to explicitly target the foundational literacy outcomes that result in effective reader and writers.

Practitioners could be taught how to integrate music, language and movement using props, puppets, visuals and instruments and how syllabic music can help children to physically embody the segments in language by moving in response to a change in syllable. Music and movement can also be used to express and embed prosodic awareness and to support language production. Practitioners could be helped to select appropriate activities that children will enjoy and that are commensurate with their ability levels and enjoyment. The recommended literacy-through-music presenter practice could be assimilated into early years training.

Consistent with the findings of other studies which suggest integration of music and literacy to impact literacy outcomes, this study suggests that such integration is a valuable strategy for the promotion of a wide range of foundational literacy outcomes and reaffirms that any such intervention should ensure that the focus of design and delivery is upon the literacy outcomes and that using music as a conduit for learning, will do much to support the learning process.

Early years provision would benefit from the inclusion of literacy-through-music interventions over a minimum two-year period, for children aged three to five years.

For future studies it would be interesting to focus on the use of gesture in music and its impact upon language learning. Also, the volitional rehearsal observed, deserved greater attention and further studies could investigate if this behaviour was engaged in at home and if other studies found it being used. Whether or not musical experience initiated this behaviour or not is also a possible area of investigation.

7.5 Limitations

Six weeks, whilst allowing a snapshot to be taken of the effectiveness of this intervention was not long enough to ensure that all participants gained in all the focus areas. A longitudinal study would allow a deeper understanding of the development of foundational literacy competencies through a musical conduit and allow longer time for competencies to develop.

Due to time constraints, only a selection of the video footage was transcribed. Other skills such as phonemic awareness and sound-to-symbol correspondence were promoted through the program by the use of a singing alphabet book, but this activity was only engaged in towards the end of the program; its impact could have been assessed if the intervention was over a longer period of time.

Without any formal assessment there could have been skills which were acquired but were not demonstrated. Children may repeat activities at home and demonstrate their new skills there and may be reluctant to demonstrate them in front of others in school. A formal assessment at the beginning and end of the intervention may have been illuminating.

Using child videographers resulted in some poor footage being collected, which was not usable and not every part of every session was recorded. This meant that for example, one activity could not be observed across every session. For the purpose of this study, this was not detrimental, but it would have been useful for further study.

7.6 Coda

In summary, the research findings showed, that engaging in activities which explicitly target foundational literacy skills through musical activities in children aged between three and five years of age can support the promotion of the competencies which support successful literacy learning. Tapping in to this sensitive period of high brain plasticity facilitates the development of sensorimotor synchronisation abilities. Synchronisation to rhythm underlies the conflation of music, language and movement by honing awareness of sound and time.

The use of music as a conduit for learning also confers all the benefits of undertaking musical activities in addition to the literacy skills being promoted, not least, enabling children to ‘learn with joy’. The integration of music, language and movement engages both hemispheres of the brain, stimulating neurological connectivity and requires children to simultaneously apply multifarious learning domains. The ability to acquire, integrate and apply foundational literacy competencies is fundamental to literacy success.

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