ADAPTING MUSIC TEACHING METHODS FOR CHILDREN DIAGNOSED WITH AUTISM SPECTRUM DISORDERS

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A thesis submitted in accordance with the requirements for the Masters' degree in Music in the Faculty of the Humanities, Odeion School of Music at the University of the Free State

June 2019

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ACKNOWLEDGMENTS

The preparation of this thesis was not an easy journey and would not have been possible without the Grace of God and the amazing people that He has placed in my life. Thank you, Heavenly Father, for your goodness and kindness towards me. Your love and mercy endure forever! I want to thank my parents for their unconditional love and support. I am truly blessed to have you in my life. Special thanks to Mrs Alie Getkate for her help; I don't think there are enough words to thank you. I also want to thank my supervisors, Dr Frélet de Villiers and Dr David Griessel; I could not have asked for better academic leaders. Thank you for your guidance, wisdom and understanding in this journey of mine; I would not have been able to do it without you. Lastly, I want to give a special thanks to the children, parents and class teachers that took part in this study.

ABSTRACT

Teaching piano to an autistic learner requires a piano teacher who understands autism and can adapt teaching material according to the individual's learning strengths. Literature revealed little information about practical and structural piano teaching methods that can be applied in a private lesson for autistic learners. This dissertation explored the practical adaptation of piano teaching methods to tutor autistic learners in a one-on-one music environment. A qualitative research method was applied and a practical action research strategy was used to teach 12 autistic learners to play the piano. Participants were selected using purposeful, stratified sampling. Journal writings and observations were kept, evaluating each participant's progress at the piano over a period of six months, while secondary information was gathered through questionnaires and semi-structured interviews were completed by parents and schoolteachers. The data were analysed thematically and themes as well as subthemes emerged that were synthesised with existing literature. The findings indicate that piano lessons should be taught by using visual adaptation as well as considering the learners' physical development and comorbidities. Piano lessons also had a positive effect on autistic learners' daily activities and progress was noticed in physical improvement, communication and social interaction, and academic improvement as well as emotional development. The results showed that 10 of the 12 participants could play easy piano pieces with confidence after six months of weekly lessons. The conclusion of this study could be valuable for teachers interested in teaching autistic learners piano, providing practical guidance how teachers could adapt the teaching methods and the environment as well as the inclusion of physical activities in the lessons. The lessons also fit into the theoretical scheme of the Naturalistic Developmental Behavioural Interventions (NDBI), allowing parents to practise and apply concepts learned in class at home and in daily activities, strengthening the child's motivation.

Keywords: Piano teaching methods; piano lessons and autism; effect of music lessons on autistic learners; music and autism; piano lessons as an intervention.

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(AD) Autistic Disorder

(ADHD) Attention-Deficit/Hyperactivity Disorder

(ADS) Autism Spectrum Disorder

(AP) Absolute Pitch

(APA) American Psychiatric Association

(AS) Asperger Syndrome

(CDD) Childhood Disintegrative Disorder

(DSM) Diagnostic and Statistical Manual of Mental Disorders

(DSM-I) Diagnostic and Statistical Manual of Mental Disorders, 1st edition

(DSM-II) Diagnostic and Statistical Manual of Mental Disorders, 2nd edition

(DSM-III) Diagnostic and Statistical Manual of Mental Disorders, 3rd edition

(DSM-III-R) Diagnostic and Statistical Manual of Mental Disorders, 3rd edition Revised

(DSM-IV) Diagnostic and Statistical Manual of Mental Disorders, 4th edition

(DSM-IV-TR) Diagnostic and Statistical Manual of Mental Disorders, 4th edition, Text Revision

(DSM-5) Diagnostic and Statistical Manual of Mental Disorders, 5th edition

(OCD) Obsessive-Compulsive Disorder

(PDD) Pervasive Developmental Disorder

(PDD-NOS) Pervasive Developmental Disorder Not Otherwise Specified

(RRB) Restricted, Repetitive Behaviours

(SBI) Sensory-Based Intervention

(SCI) Social Communication and Interaction

(SIT) Sensory Integration Therapy

(ToM) Theory of Mind

(WCC) Weak Central Coherence

(ZPD) Zone of Proximal Development

CHAPTER 1: BACKGROUND AND RATIONALE

After teaching piano to an autistic learner for a year, I realised that I am not equipped with the necessary information about Autism Spectrum Disorder (ASD) to fully understand the child, and give him the best tuition he deserves. According to Fuentes, Bakare, Munir, Aguayo, Gaddour and Öner (2014:2), ASD is a neurodevelopmental disorder defined by several behavioural features that emerge in individuals in the early developmental period.[1] As will be discussed later, some of the features of autism may make teaching a musical instrument to an autistic learner difficult. As a piano teacher I noticed that there are few piano teaching methods readily available adapted to teach a learner on the autistic spectrum.

Numerous disciplines have studied music education in an inclusive[2] and music classroom (Darrow, 2009:25; Deris & Di Carlo, 2013:55; Hourigan & Hourigan, 2009:41) and literature revealed a large amount of information about some autistic individuals' remarkable capability in music and their responsiveness to music and how music has a positive influence on autistic individuals (Hourigan & Hourigan, 2009:41-42; Heaton, 2009:1446; Whipple, 2004:102), the primary literature being in the field of theses and dissertations conducted by Master's and PhD students (Jimenez, 2012; Tracie, 2016). However, little attention has been given to the translation of knowledge into practical, easily available methods, where established teaching methods have been adapted to teach an autistic child to play the piano.

1.1 TEACHING AUTISTIC LEARNERS IN THE INDIVIDUAL PIANO LESSON

A small number of studies explored how music teachers adapted the instrumental lesson plan to teach children with autism effectively; however, the reviews did not

[1] ASD will be discussed in depth in Chapter 2.

[2] The inclusive classroom refers to the inclusion of children with autism in a general or music classroom, whereas the music classroom refers to self-contained music classes only focusing on autistic learners.

give practical instructions out of the researchers' personal teaching experience to guide teachers how to teach autistic learners to play the piano. Neither did the studies focus on an in-depth understanding of the neurodevelopmental disorder autism and comorbidities that often interrupt the piano lessons, nor on the adaptation of the environment. The information provided by the studies also did not point to practical details that teachers could apply to create a piano teaching method book for children diagnosed with autism. A study by Jimenez (2012), *An exploration of teaching music to individuals with autism spectrum disorder* was conducted, using a grounded-theory approach to explore how private music teachers (three piano teachers; one drum teacher) adapted the environment and lesson plans to teach children with autism effectively (Jimenez, 2012:27). In another study, *Teaching piano to learners with disabilities: A collective case study* by Tracie (2016), interviews were conducted with three individual piano teachers who taught children with different disabilities, including autism. All three experienced good results in their individual teaching approaches, adapting the lessons according to the individual's interest and allowing the learner to guide the lessons (Tracie, 2016:34). Participants in both studies taught children diagnosed with autism, but none of the studies revealed that the children being taught were diagnosed by a professional clinician. The primary focus of both studies was to explore how piano teachers taught autistic learners and children with various disabilities in a private music studio setting. Neither of these studies did an in-depth study understanding autism and on how piano teaching methods should be adapted effectively to benefit the autistic learner, whereas this study aims specifically to adapt established piano teaching methods to teach autistic learners.

Jimenez (2012:31) primarily gathered information through the use of intensive interviewing. It was found that teaching methods used by teachers were not based on prior research methods and were solely adapted according to personal experience, trial-and-error, self-study, reading and equipping oneself by studying autism (Jimenez, 2012:39). In both studies by Jimenez (2012:52) and Tracie (2016:36), teachers expressed critique regarding the lack of individual music teaching material for autistic children. This is supported by Polischuk (2016:18) and Martiros and Hanley-Maxwell (2013:12), as they note that there is especially a need

for structural piano teaching methods that can be used in one-on-one piano lessons. Martiros and Hanley-Maxwell (2013:12) continue by mentioning the piano teacher's reluctance to teach children with disabilities, especially learners with emotional and behavioural disorders, as teachers lack the training and adequate resources. According to Tracie (2016:37), a teacher mentioned that he did not feel that the existing piano method books provided enough flexibility, indicating that he would like to see a piano method book published especially for children with disabilities.

A clear need thus arises in the field of pedagogical piano literature on how to teach autistic learners to play the piano, as there is no information in one-on-one piano teaching methods to equip teachers with the necessary material and understanding of autism. Literature reveals information about the positive effect of music intervention, music as a therapeutic intervention and music therapy (De Vries, Beck, Stacey, Winslow & Meines, 2015:223-224; Finnegan & Starr, 2010:339; Kern, Wolery & Aldridge, 2006:1270), the inclusion of autistic learners in an inclusive and music classroom setting and how teaching methods should be adapted to benefit these learners (Darrow, 2009:25; Deris & Di Carlo, 2013:55; Hourigan & Hourigan, 2009:41), and the positive effect music has on autistic children (Allen, Hill & Heaton, 2009:31-36), as well as the natural ability of some autistic children to play the piano (Graham, 2001:40-41). However, none of the literature focuses on the piano method adapted for children diagnosed with autism.

In my study I will adapt an established piano teaching book, *My First Piano Adventure for the Young Beginner*[3], according to teaching approaches found successful in both the inclusive and music classroom,[4] as mentioned in the literature review. Learners participating in my study were all children that had been diagnosed with autism by a professional clinical practitioner. The study may guide teachers to teach autistic learners successfully to play the piano.

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[3] Both the lesson and writing book of My First Piano Adventure for the Young beginner will be used in this study.

[4] Teaching methods found successful in the inclusive and music classroom will be discussed in depth in Chapter 3.

1.2 IMPORTANCE OF UNDERSTANDING AUTISM

Teaching an autistic child how to play the piano entails knowledge about autism, how they learn in the school environment and how established piano teaching methods can be adapted to teach them optimally. According to Scott (2014:7), "knowledge and understanding of how individuals on the autism spectrum[5] learn is critical to the success of this endeavour". It is therefore important to understand autism and how the neurodevelopment disorder affects the functioning of the brain. Autism is a spectrum disorder where the severity of impairments differs amongst children, depending on the individual's personal characteristics (Scott, 2014:3). The impairments in autism are characterised by deficits in two areas of functioning, namely social communication and social interaction, as well as restricted repetitive patterns of behaviour, interest or activities (APA, 2013:50; Fuentes et al., 2014:2).

Persons on the spectrum tend to have highly restricted, fixated interests and often insist on the sameness to routines, with ritualised patterns of verbal or nonverbal behaviour (APA, 2013:50), "to cope with stressors in the world around them" (Scott, 2014:3). The American Psychiatric Association (APA, 2013:50) includes hyper- or hypo-reactivity to sensory stimuli as well as an unusual interest in sensory aspects of the environment to the diagnostic criteria (Fuentes et al., 2014:4). These facts may be important in music teaching, as all the sensory organs are used during the acquisition of music skills (Hourigan & Hourigan, 2009:44). Children on the spectrum often have difficulties understanding and reading emotions (APA, 2013:50; Feuntes et al., 2014**).** This might lead to an inability to understand what is expected of them and might create a problem with imitation.

Deficits in the ability to learn through imitation and rote learning limit an individual's learning process of informally learning through experiences in the environment and society (Scott, 2014:3). According to Scott (2014:1), many music teachers rely on rote learning and imitation to teach new concepts to learners. This may pose problems for autistic learners who have difficulties in the pragmatic of communication

[5] Individuals diagnosed with ASD are often referred to as being on the spectrum in literature studies due to the severity of the impairments.

and find the interpretation of language and social skills difficult. Persons on the spectrum may need visual support, as they are mainly visually orientated and learn better with appropriate visual material, along with verbal instructions to understand new concepts (Hourigan & Hourigan, 2009:41; Garside, Ghag, Haines, Hamilton, Hansen, Hockin, Hovestad, Ireson, MacKenzie, Malette, McDougall, Mirenda, Mjolsness, Perrin, Porco, Seip, West & West, 2000:27,40). Visual aids also allow the learner to use them as long as they need to process the information learned during the lesson (Garside et al., 2000:27).

According to Hourigan and Hourigan (2009:41), oral instruction should be used carefully, using a limited amount of words, while reinforced with visual aids and nonverbal cues such as gazes or hand gestures to teach and communicate with autistic learners (Hourigan & Hourigan, 2009:42). Makaton, a sign language used in some schools to communicate with autistic children (Bennett, 2015), may be used during lessons to explain new concepts.

Exploring with different piano teaching methods and adapting it in a way appropriate for them may thus be beneficial to learners' on the spectrum. According to Scott (2014:1),

> Music educators are challenged to examine how children with ASD learn and use this information to create music experiences for children on the autism spectrum by adapting commonly used teaching strategies to meet the distinct learning styles of these children.

Music teachers will be better prepared to interact and teach children on the spectrum if they establish a solid communication strategy between teacher and child and understand how autistic children learn (Hourigan & Hourigan, 2009:41; Scott, 2014:1). Different approaches can be used involving visual aids, video modelling and prompting to teach an autistic learner effectively (Garside et al., 2000:42). Visual aids involves the use of objects, colourful pictures and line drawings to illustrate new concepts (Garside et al., 2000:28), while video modelling involves a model (teacher) being video recorded engaging in the desired technique, behaviour or action, and a learner who watches the video demonstration (Case & Yun, 2015:23). Case and Yun (2015:22) explain that visual support can be used during a physical activity,

improving communication between the teacher and the learner, increase on-task behaviours and bring about positive behaviours as well as skill-related improvement.

Another approach found to be an important element in teaching autistic learners is prompting using physical, gestural or verbal prompts (Garside et al., 2000:32). Prompts are often used in lessons when new concepts or skills are introduced and gradually become fewer, depending on the learner's understanding and progress.

1.3 RESEARCH PROBLEM AND OBJECTIVES

The study aims to combine teaching approaches found successful in teaching autistic learners in the school environment with the adaptation of *My First Piano Adventure for the Young Beginner Lesson Book* A, by Nancy and Randall Faber (Faber & Faber, 2006a) and *My First Piano Adventure for the Young Beginner Writing Book A* (Faber & Faber, 2006b).

The objective of my study is to determine the practicality and suitability of adapting teaching methods used for autistic children, as embedded in the *Piano adventure* method books. Learning to play the piano may have a positive impact on both the emotional and physical development of the learner. In order to offer solutions to the outlined situation and to observe the impact that piano lessons may have on autistic learners, the overarching question that this study aims to answer is:

> **How to adapt music teaching methods to help the autistic child learn to play the piano?**

I hypothesise that the transformation and adaptation of teaching methods may equip the teacher to help the autistic learner to learn to play the piano. By adapting the eclectic *Piano Adventure* method books, and combining it with teaching methods appropriate for autistic children, effective piano teaching material and methods can be developed that may help the autistic learner to understand the concepts better. Learners might learn identifying the white and black keys, understanding direction, dynamic markings and reading notes; as well as keeping a good posture, rounded hand shape and a flexible wrist technique.

1.4 RESEARCH DESIGN AND METHODOLOGY[6]

The study followed a constructivist paradigm, which is generally qualitative. An extensive literature review about Autism Spectrum Disorder and teaching methods used to teach autistic children, as well as appropriate piano teaching methods was undertaken. Two different questionnaires were used; one to determine whether the child experienced hyper- or hypo-sensitivity in specific areas completed by the parents/guardians before piano lessons commence; and another questionnaire to evaluate the effect, influence and impact the piano lessons have on an autistic learner over a period of six months. The latter questionnaire was based on the Parental Concerns Questionnaire (PCQ) and was streamlined for the parents/facilitators and class teachers. Questionnaires were handed out to parents/facilitators and class teachers at the first piano lesson, as well as after three and six months, respectively. Data collection also included personal interviews with the parents on a weekly basis, journal writings by myself after every piano lesson and interview, and Participatory Action Research by giving private lessons to 12 autistic learners at my studio.

Thirty-minute piano lessons were given on a weekly basis at the same time for a period of six months. For the purpose of this study I used visual aids combined with the *Piano Adventure* method books (Faber & Faber, 2006a). *Piano Adventure* for the young beginner explains important piano techniques using simple colourful pictures, and allows the learner to learn the correct hand position and develop big-muscle movements. In a journal article by Case and Yun (2015:21) the importance of using visual aids and video modelling before and during physical activities is emphasised in order to prepare the autistic learner for the activity (Case & Yun, 2015:22). Therefore, it is important to introduce extra teaching materials and games, visual aids, video modelling, prompting and adapting communication skills (sign language, hand gestures) during lessons to reinforce learned concepts in a clear and visual way. Games should only represent one music concept at a time and not a variety of concepts, which may be overwhelming to an autistic learner.

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6 The methodology will be discussed in detail in Chapter 4.

1.5 TRUSTWORTHINESS AND DEPENDABILITY OF THE STUDY

To establish the trustworthiness of the study, a highly structured, transparent and detailed approach was sought making use of action research as well as data collection techniques that have validity and reliability in the research community. These were established by considering four points, namely credibility, transferability, dependability and confirmability (Lincoln & Guba, 1985:219). The credibility of the study was established by means of incorporating prolonged engagement, persistent observation, triangulation and negative case analysis (Stringer, 2007:57-59). Therefore, the full transcripts, journal and observations of piano lessons, as well as the actual questionnaires and interviews are provided.

Transferability will be ensured providing thick descriptions of each participant, allowing individuals' interested in deciding whether they would like to apply the study (Lincoln & Guba, 1985:316). Dependability will be incorporated using "overlap methods" such as observation, journal writings, interviews and questionnaires (Guba, 1981:86). To established confirmability in the research, an audit trail was used enabling external auditors, such as the supervisors and external examiners, to view the data collected such as the actual interviews, questionnaires, journal writings and observation, as well as transcriptions of the piano lessons (Stringer, 2007:59). The different data collection techniques were incorporated to reduce the possibility of bias in the study and to ensure that the study does not merely reflect the perspectives and worldview of the researcher. Data gained from the participatory action research, journal entries, questionnaires and interviews were analysed to reach a conclusion regarding the use of the afore-mentioned aids in the lesson situation.

1.6 VALUE OF THE RESEARCH

Pedagogical piano literature is scarce with regard to teaching children diagnosed with autism, and a need was identified for practical data in the field of the adaptation of piano teaching methods. Previous studies collected data using interviews; however, none of these studies used action research allowing the researcher to become actively part of the study to adapt teaching material as well as the

environment according to the literature review. It was hoped that with the correct adaptation learners would be equipped with the ability to understand and read basic music notation fairly comfortably. If I could demonstrate that these adaptations have a positive effect on autistic learners, it might be useful to music teachers teaching autistic learners.

The study would contribute to the field of music teaching methods, allowing a better understanding of neurodevelopmental disorders in a private music studio and equipping teachers with the necessary knowledge to help and teach learners to play the piano. The information and guidelines that emerge from this study might be used in different teaching areas and interventions to teach autistic learners new concepts, whether to play a musical instrument or to learn to bake a cake. It is hoped that the adjustments may lead to a publication of a relevant teaching manual that music teachers can apply in the piano lessons, and that will give teachers a better understanding of autism as well as insight into the different cognitive thinking processes and emotional aspects that often influence a music lesson. The adaptation of the piano teaching material or the environment will not be possible without the necessary understanding of autism or comorbidities that often influence the learning environment. The following chapter will look at the evolvement of autism over some time.

CHAPTER 2: LITERATURE REVIEW, UNDERSTANDING AUTISM

The first section of the literature review will describe how the understanding and diagnoses of autism have evolved and changed over the years. It will look at the background of autism from where the disorder was described the first time to the latest diagnosis in the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5). The clinical features of autism and comorbidities will be discussed as well as how these may have an impact on the teaching methods that need to be adapted. A sensible starting point is to comprehend the diagnosis of autism and how it influences a child's behaviour. The focus will therefore be on the theories that explain the cognitive thinking processes in children. Sensory sensitivity and the benefit of physical exercises will be evaluated. These aspects are vital to adapt the teaching environment effectively according to the child's needs. The better autism is understood, the more effective teaching methods can be developed to benefit a child diagnosed with autism. By exploring the literature and testing this knowledge in an active participatory research model, a significant contribution in the area of piano teaching methods for children diagnosed with autism spectrum disorder (ASD)[7] can be made.

2.1 THE EVOLVEMENT OF THE UNDERSTANDING AND DIAGNOSES OF AUTISM OVER A PERIOD OF TIME AND HOW IT AFFECTS THE BEHAVIOUR OF THE INDIVIDUAL

The understanding of the word *Autism* and the specific characteristics defining the disorder have gradually developed over the years, as researchers, physicians, psychiatrists and psychologist studied this particular field. The unfolding of the diagnostic criteria will be examined in the following section by looking at the background of how autism has evolved and developed over time. The development from the first DSM-I[8] to the DSM-IV-TR[9] will be reviewed and the focus will be on the

[7] Children that have been diagnosed with autism spectrum disorder (ASD) will hence be referred to as children.

[8] Diagnostic and Statistical Manual of Mental Disorders, 1st edition

primary changes made in diagnosing autism in the latest DSM-5, compared to the previous DSM-IV-TR. The clinical features for diagnosing autism in the newest DSM-5 will be stated, as well as how these features have an impact on teaching methods. Different theories explaining the cognitive thinking process in children and how these processes may affect musical skills will be studied. Sensory sensitivity and how physical exercises can be used to benefit individuals with autism during class activities will be explained.

2.1.1 The background of autism and how it has evolved over the past decades

The incidence of Autism Spectrum Disorder has increased rapidly in the past decade (Whitehouse, 2013:12; Newschaffer & Curran, 2003:393; Reschke-Hernández, 2011:169). According to the Centers of Disease Control and Prevention (2014:2), there has been a twenty- to thirtyfold increase in autism prevalence since the earliest epidemiological studies in the 1960s and 1970s. This increase in autism among children makes it a field that needs exploration and understanding.

According to the American Psychiatric Association (APA, 2013:56), autism is not a degenerative disorder and it is typical for learning and compensation in these children to continue throughout life. According to Wing (1997:20), “much can be done through education to improve [the] quality of life for all those affected [diagnosed with autism] regardless of ability”. To create an optimal teaching environment for these children, it is crucial to understand how autism was described at first, how it developed over the past eight decades and how it is recognised by the American Psychiatric Association (APA, 2013) in the latest DSM-5.

The understanding of autism has evolved over the past years, and continuous changes have been made to the DSM to understand autism and to create an awareness of autism among professionals, parents and the general public. Autism, as we know and understand it today in psychiatry and psychology, has evolved from being considered a psychosis or a psychotic disorder (Prior, 1984:4) to being

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[9] Diagnostic and Statistical Manual of Mental Disorders, 4th edition, Text Revision

recognised as a pervasive developmental disorder in the DSM-III, 1980 (Evans, 2013:21; Reschke-Hernández, 2011:172; Feinstein, 2010:178; Prior, 1984:4; APA, 1980:86) and a neurodevelopmental disorder in the latest DSM-5 (APA, 2013). According to the DSM-5 (APA, 2013:31), neurodevelopmental disorders are characterised by developmental deficits that produce impairments of personal, social, academic, or occupational function.

Autistic characteristics were mentioned in myths and legends long before they were discussed in academic articles (Frith, 2003:34-57). Many of the individuals described for their remarkable talents and skills would have been diagnosed with autism in recent years (Verhoeff, 2013:445; Reschke-Hernández, 2011:171; Wing, 1997:13-14). Autism was first mentioned by Dr Eugen Bleuler, who was the creative originator of both the terminology *schizophrenia* (1908) and *autism* (1911) in Switzerland (Fuentes et al., 2014:2; Evans, 2013:4; Kuhn, 2004:361; Frith, 1991:38). Approximately 30 years after the term *autism* had first been used by Bleuler, Leo Kanner (1943) and Hans Asperger (1944)[10] used autism as we understand it today in psychology, psychiatry and medicine. The word *autism* is derived from the Greek word *autos,* meaning self (Feinstein, 2010:5; Fuentes et al., 2014:2), and was used by Bleuler to describe schizophrenic patients when they withdrew from reality into their fantasy world to cope with the outside world (Kuhn, 2004:364).

In 1943 Kanner, a psychiatrist at the Johns Hopkins University Hospital in the United States of America, published his classic paper *Pathology – autistic disturbances of affective contact*, describing eleven children, eight boys and three girls (Reschke-Hernández, 2011:171; Feinstein, 2010:165; Kanner, 1943:241). Kanner's observations in his 1943 paper, which he termed *infantile autism*, became a guideline for diagnosing autism and some of the observations are still relevant today (Verhoeff, 2013:445; Fuentes et al., 2014:2). The progress of understanding and documenting autism as a syndrome did not happen smoothly and was often

[10] Uta Frith (1991:37-92) translated Hans Asperger's paper published in German (1944) into English.

associated with Bleuler's use of autism, which he explained as schizophrenia in young children (Evans, 2013:4-23; Feinstein, 2010:165-166). According to Evans (2013:4), the term *autism* as explained by Bleuler was adopted by psychologists, psychoanalysts and psychiatrists in Britain throughout the 1920s up until the 1950s. It was only in the 1960s that British child psychologists challenged Bleuler's definition of autism, leading to a radical transformation of the word *autism*.

In another study, *One hundred schizophrenic children,* by Lauretta Bender (1946), she used the term *childhood schizophrenia* to describe her observation of individuals similar to those in Kanner's 1943 paper (Bender, 1947:49; Feinstein, 2010:166). The use of the term *childhood schizophrenia* gave rise to psychiatrists and psychologists adopting the terminology around the world until at least the 1960s (Feinstein, 2010:166). A research paper by Kolvin (1971:12) concluded that the onset of autism in children was earlier than those diagnosed with schizophrenia. According to Rutter (1972:327), autism was associated with a failure in social communication, a deficit in language development and ritualistic activities, while schizophrenia was a psychosis with symptoms such as delusions and hallucinations. Rutter (1972:327) explains the meaning of autism as a withdrawal into a fantasy world whereas, in fact, an autistic child fails to develop social relationships. The understanding of autism being connected to symptoms associated with schizophrenia lead to a misconception amongst parents and educators, hindering the necessary support. Fuentes et al. (2014:3) explained,

> It was a misfortune that the original meaning of Bleuler's term and its theoretical association with schizophrenia, combined with the psychoanalytical theories dominant in the mid twentieth century, amalgamated ASD with psychotic disorders under the rubric of childhood schizophrenia.

Individuals were not only incorrectly diagnosed with childhood schizophrenia, but a stigma was placed on the families associating them, as explained by Fuentes et al. (2014:3), to be a pathogenic family. The correct medical treatment and education were withheld from individuals, as the children's behaviour was associated with schizophrenia instead of impairment in social communication, interaction and restricted, repetitive behaviour.

2.1.2 The development of autism from the DSM-I to the DSM-IV-TR

In the hope of understanding various types of psychological behaviour, the American Psychiatric Association (APA) published the predecessor of the DSM in 1844. It was developed by the United States to gain statistic information of “idiocy/insanity” in the 1840 census. The DSM was primarily designed to improve communication about and classification of patients institutionalised in mental hospitals (APA, 2013:6). After World War II, the DSM evolved through four major editions and revised editions before the fifth edition was published in 2013. The DSM developed into a diagnostic classification system to help medical clinicians understand and classify mental disorders.

After extensive research, the third edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-III) was published in 1980. Research that was conducted prior to the DSM-III had a significant impact on the removal of autism as a ‘psychotic disorder’ and ‘childhood schizophrenia’; instead, infantile autism was categorised as a ‘pervasive developmental disorder’ (Evans, 2013:21; Prior, 1984:4; APA, 1980:86). The term *pervasive developmental disorder* (PDD) refers to multiple functions affected in the individual’s development process, along with severe qualitative abnormalities that are not normal for any stage of development (APA, 1980:86). The DSM-III (1980) also published criteria that, for the first time, allowed psychologists, psychiatrists and physicians to diagnose infantile autism as mentioned by Kanner in his 1943 paper (Feinstein, 2010:178).

The DSM-III (1980:87) describes the essential features of infantile autism, which include lack of responsiveness, eye contact, aversion to physical contact and cuddle that might manifest during infancy. A deficit in language and communication shows up in early years and language may be absent or develop at a later stage, often characterised by immature grammatical structure (APA, 1980:87). The DSM-III (1980:89) criteria consisted of six factors to diagnose an individual with autism,

- onset before 30 months of age;
- lack of responsiveness to other people;

- impairment in language development;
- if speech is present, peculiar speech is noted, such as immediate and delayed echolalia, metaphorical language, pronominal reversal;
- bizarre responses to various aspects of the environment; for example, resistance to change, peculiar interest in or attachments to animate or inanimate objects; and
- absence of schizophrenia.

The removal of schizophrenia associated with autism defined the exclusion of autism as a psychotic disorder or psychosis in the DSM-III (APA, 1980:89-90).

In the revised edition of the DSM-III, the DSM-III-R (1987:34-38), the terms *infantile autism* and *Kanner's syndrome* were removed from the subgroup PDD and replaced by *autistic disorder* (AD). The argument was that children who were diagnosed with infantile autism grew up to be adults with autism. The term *infantile autism* was therefore no longer appropriate and was renamed AD (Feinstein, 2010:180). In the DSM-III-R (1987), AD was the only subgroup in the category of PDD. Other disorders that met the criteria for PDD, but not the criteria for the AD, were classified as *Pervasive Developmental Disorder Not Otherwise Specified* (PDD-NOS). According to researchers in England and America, who used similar criteria to the DSM-III, PDD-NOS was often diagnosed more than autistic disorder in both England and the United States (APA, 1987:34), whereas AD was more commonly seen in the clinical setting.

The criteria for the AD was revised in more detail in the DSM-III-R (1987:38) and consisted of four points. The first three points were

(i) impairment in reciprocal social interaction;
(ii) impairment in verbal and nonverbal communications and imaginative activity; and
(iii) restricted repertoire of activities and interests.

Each had several individual points that had to be met. To diagnose autistic disorder[11], a total eight of the sixteen points had to be present. The fourth point, (iv) onset during infancy or childhood, did not have additional points, but the diagnosis had to be made before the child reached the age of 36 months.

After the publication of the DSM-III in 1980 and DSM-III-R in 1987, numerous research studies were conducted before the fourth edition, DSM-IV was released in 1994. In a journal article, *Asperger's syndrome: a clinical account,* Wing (1981:115) uses the terminology *Asperger's Syndrome* to refer to the presentation in children as described by Asperger (1944) in his article, *autistic psychopathy*. This study had a great impact on the DSM-IV and Frith's 1991 translation of Hans Asperger's 1944 thesis into German (Fuentes et al., 2014:2-3; Frith, 1991:37-92) made people aware of a subgroup of children with better language abilities, but also the social disability of Kanner's autism. Asperger noticed similar characteristics in a group of children as Kanner did in 1943, but the primary difference was the onset of speech (Frith 1991:96-97). According to him, the group of children in his research study developed normally at the beginning of their developing years, and it was only later that parents or caregivers noticed changes. The DSM-IV published by the APA in 1994 identified Asperger Disorder later named *Asperger Syndrome* (AS) as one of the categories under PDD. The DSM-IV (1994:70-71) expanded on the DSM-III (1980) criteria and included a markedly restricted repertoire of activity and interest before the age of 36 months. This repertoire included five different categories under PDD, namely autistic disorder (AD), Rett's Syndrome, childhood disintegrative disorder (CDD), Asperger's disorder, and pervasive developmental disorder not otherwise specified (PDD-NOS).

Individuals diagnosed with AD have restricted, repetitive and stereotyped patterns of speech, behaviour, interest and activities, which can manifest itself in numerous ways (APA, 2000:71; APA, 1994:67). Children who do speak make use of idiosyncratic language (APA, 2000:70; APA, 1994:66). Individuals are often inflexible in specific patterns of behaviour and may have an obsessive interest in non-

[11] Different terminology is used to refer to Autism Spectrum Disorder, Autism Disorder and Autistic Disorder.

functional routines or rituals (APA, 2000:71). When these routines are not followed, individuals may experience high levels of anxiety and distress. It is often noticed that individuals may have an intense interest in and immense knowledge of one specific area (for example, colours, dinosaurs, zombies), but cannot talk about different topics or participate in a conversation that does not revolve around their interest. In AD the receptive language (language comprehension) is below expressive language (vocabulary) and, although individuals may communicate and participate in communication, there is often a lack of understanding (APA, 1994:67). Depending on the severity of autism, individuals find it challenging to comprehend instructions or follow through with an instruction. Instructions and words are often understood literally and figurative speech, for example, 'it is raining cats and dogs', can cause considerable confusion.

The DSM-IV gave an in-depth explanation, as well as examples of the various features identified in individuals diagnosed with autism. Changes were made regarding the criteria for the diagnosis of the AD. There is typically no period of normal development in AD (1994:67). According to the criteria in the DSM-IV (1994:70-71), a total of six or more items have to be present to diagnose autism. If the criteria for AD are not met, attention should be given to one of the other PDD subgroups.

2.1.3 The primary diagnostic changes in autism between the DSM-IV-TR and DSM-5

The primary change in diagnostic criteria for autism, between the DSM-IV-TR and DSM-5, included a shift from a multi-categorical model to a single category (Huerta, Bishop, Duncan, Hus & Lord, 2012:1056). Autism is now seen as a spectrum with a dimensional aspect, blending into the typical population. The subgroups in the DSM-IV-TR have been removed and placed under one category, namely Autism Spectrum Disorder in the DSM-5 (Wilson, Gillan, Spain, Robertson, Roberts, Murphy, Maltezos, Zinkstok, Johnston, Dardani, Olson, Deeley, Craig, Mendez, Happé & Murphy, 2013:2516; Happé, 2011:540), with the exclusion being Rett's Syndrome, due to its known genetic aetiology (APA, 2013:33; Anon, 2011:609). The diagnostic criteria were reduced from three domains to two domains, merging social impairment

and communication impairment into one category (Wilson et al., 2013:2516; APA, 2013:50-51; Huerta et al., 2012:1056), the reason being that language is a social tool for human beings. To be diagnosed with autism on the DSM-5 (APA 2013:50-56), individuals have to meet the two social domain criteria, specifically meet diagnostic criteria in the three domains from the social communication and interaction (SCI) criteria and two criteria from the list of four for restricted, repetitive behaviours (RRB) (Kulage, Smaldone & Cohn 2014:1919).

One of the problems experienced in the DSM-IV-TR was the ambiguity in the diagnosis of deficits in social communication, as communication needs some form of socialising and interaction with others (Wilson et al., 2013:2516). Often clinicians were not certain under which subgroup of PDD the classification should be made, thus contributing to disagreements between clinicians (Kim, Fombonne, Koh, Kim, Cheon & Leventhal, 2014:501; Wilson et al., 2013:2516). Another problem that existed was the uncertainty regarding speech development in AS (Happé, 2011:541). The only difference between AS and AD was the onset of speech, and often parents or caregivers could not remember at which age the child started to speak. Many individuals diagnosed with AS also met the criteria for AD (Happé, 2011:541).

2.1.4 How autism is diagnosed in the latest DSM-5

The latest release of the DSM-5 (APA, 2013:52) categorises autism into three different levels of severity, with Level 3 as the most severe. Individuals diagnosed on Level 3 require substantial support in social communication and in restricted, repetitive behaviour. Without substantial support in place, individuals will find it extremely difficult to function. Individuals whose social communication is diagnosed on Level 3 will experience severe deficits in verbal and nonverbal communication. They will seldom initiate social interaction with others and will respond with the minimal social overture. When they do initiate interaction, they will approach in an unusual manner only to meet their needs. Individuals who have been diagnosed on Level 3 with restricted, repetitive behaviour experience inflexibility of behaviour and extreme difficulty in coping with change. Change can lead to great distress and

individuals may experience a meltdown trying to cope with a change in their own fixed routine (APA, 2013:52).

Persons on Level 2 require substantial support in either or both social communication and restricted, repetitive behaviour. Marked deficits in verbal and nonverbal social communication are noticeable, even if support is in place. A person may use simple sentences with his or her narrow interest in a specific topic; this leads to conversations that are limited and that circle around one topic only (e.g. dinosaurs, animals, zombies). On Level 2, the restricted, repetitive behaviour of individuals is noticeable and repetitive behaviour will interfere markedly with functioning activities (APA, 2013:52).

Individuals on Level 1 require support to function in social communication and interaction. Without support in place, a deficit in social communication will cause noticeable impairment. Individuals will find it difficult to initiate social interaction with others and interaction will primarily be atypical and unsuccessful. Restricted, repetitive behaviour on Level 1 causes significant interference in one context or more. Individuals find it difficult to switch between different activities and persons on Level 1 experience problems in organising and planning. Difficulty in organising and planning limits their ability for independence (APA, 2013:52).

The latest DSM-5, (American Psychiatric Association, 2013:53) explains the essential features of ASD as impairments in reciprocal social communication and social interaction, as well as restricted, repetitive behaviour. Persons diagnosed with autism find it difficult to comprehend language, whether spoken or written. Individuals will often talk fluently, but their understanding of what they say or what is being said to them is limited. Expressive and receptive language is considered separately in the DSM-5, as receptive language may often lack expressive language (APA, 2013:53). Several changes have been made and the latest edition of the DSM-5 includes hyper- or hypo-reactivity to sensory stimuli. Individuals diagnosed with autism are often sensitive to sensory stimuli and find it difficult to be sociable, as it may cause pain, fear or uncertainty. Sensory sensitivity influences the child's ability to adapt in social situations, where caregivers cannot control the environment concerning noise, visual stimuli or smell and which can cause a meltdown (Little,

Ausderau, Sideris & Baranek, 2015:2986). Individuals with hyper-responsiveness are more likely to react negatively to social or community events than individuals with hypo-responsiveness do.

According to the DSM-5 (APA, 2013:53), the manifestation of the disorder varies greatly, depending on the severity of the autistic condition, developmental level and chronological age. Autism disorder comes within a spectrum of different levels of severity and varies from mild to severe. In some instances, an individual may be diagnosed on Level 1 for social communication difficulties, while the severity in restricted, repetitive behaviours is on Level 3 (APA, 2013:51).

2.1.5 The impact of autistic clinical features of autism on the adaptation of teaching methods

In a presentation by Dr David Griessel (2015) at the University of the Free State he stated, “We know more about the core of autism than the edges.” The primary autism traits are known to be social communication reciprocity and restricted, repetitive behaviour. Autism traits overlap with multiple characteristic traits of psychiatric disorders with autism as the centre. The same genetics underpin these different disorders (for example, Attention-Deficit/Hyperactivity Disorder, cognitive deficit, anxiety, depression), which can explain some overlapping between the disorders (Griessel, 2015).

The DSM-5 added comorbidity to the diagnosis, explaining the various psychiatric symptoms that co-exist with autism. According to the APA (2013:58), about 70% of individuals with ASD may have one comorbid mental disorder, and 40% may have two or more comorbid psychiatric disorders. The presence of other symptoms (anxiety disorder, ADHD, language disorders) should be noted and treated (Tanguay, 2011:1142). If these symptoms are sufficient to meet the criteria for other medical conditions, commonly associated with ASD, a diagnosis of two or more disorders should be made (APA, 2013:53; Tanguay, 2011:1142). These medical conditions, which are commonly associated with autism, should be placed under “associated with a known medical or genetic condition or environmental factor” (APA, 2013:59).

The overlapping of autism with another psychiatric disorder often complicates the child's behaviour in the classroom and attention should be given to both comorbidity and autism (Hayashida, Anderson, Paparella, Freeman & Forness, 2010:243). A diagnosis of ADHD (Attention-Deficit/Hyperactivity Disorder) adds distinctive characteristics coexisting with ASD, creating a risk of poor involvement, socially adaptive problems and academic dysfunctionality in the classroom and difficulties in following a daily routine (Romero, Aguilar, Del-Ray-Mejíasm, Mayoral, Rapado, Peciña, Barbancho, Ruiz-Veguilla & Lara, 2016:272). The coexistence of different psychiatric disorders, for example, intellectual disability along with autism, has a major effect on individuals' behaviour and reaction to the environment (Hayashida et al., 2010:243). Children diagnosed with autism will often (35-40%) meet the criteria for both ASD and intellectual disability (APA, 2013:31, 51, 58) or ASD and ADHD in 70-80% of cases.

It therefore seems essential to keep the comorbidity of different neurodevelopment disorders in mind when teaching children diagnosed with autism. The comorbidity of neurodevelopmental disorders will often affect the method or approach used during piano lessons. When teaching an individual with autism and a comorbid disorder (such as ADHD, anxiety disorder or Obsessive-Compulsive Disorder) exists, the focus should first be to recognise the comorbid disorder and change the teaching environment accordingly to minimise distractions. Teaching is often made difficult or impossible, because the comorbid disorder overlaps with the ASD, thus causing the child to experience a lack of focus and/or just trying to cope with anxiety and changes in the environment. Children diagnosed with autism find it difficult to communicate their feelings of anxiety or to voice their difficulties due to their communication deficits (Romero et al., 2016:273).

An in-depth and detailed diagnosis is therefore critical for individuals in order to get the necessary medical, educational and community support (Kulage et al., 2014:1927-1928). Limitations in communication and comprehension of language make it difficult for people with ASD to be diagnosed and for clinicians to identify comorbidity between ASD and other psychiatric disorders (Romero et al., 2016:273). Additional information and the level of support required for each will equip

professionals, parents and teachers with the necessary knowledge to help individuals effectively.

Individuals diagnosed with autism experience a deficit in social communication, interaction and reciprocity with other people. Language-driven interaction is the primary tool that piano teachers use when teaching children to play the piano. Piano teachers explain musical concepts verbally, play an example of a music piece and often ask learners to do the same. Teaching methods that are primarily based on verbal explanation and imitation can be daunting for a child on the spectrum (Scott, 2014:2-3). Individuals often demonstrate strengths in concrete thinking, rote memory, understanding of visual-spatial relationships and experiences and difficulties in abstract thinking, social cognition, communication and attention (Garside et al., 2000:27). It is therefore essential to understand and acknowledge problems in the learning and behavioural areas of children diagnosed with autism and adapt interactions in an appropriate way.

Children often experience high levels of anxiety, which in various situations may lead to a meltdown when they encounter an overload of information (Willis, 2009:86). Overload can be caused by multiple factors, such as a new environment or a change in the environment, sensory overload or a sense of failure when work seems too complicated. Understanding autism and how the neurodevelopmental disorder changes the individual's way of experiencing life and processing of new information, allows the teacher to change the environment effectively and adapt the teaching methods to benefit the learner (Martiros & Hanley-Maxwell, 2013:5-8). The emphasis should not always be on the deficit, but rather on the strength of the individual.

2.2 THEORIES EXPLAINING THE COGNITIVE THINKING PROCESSES IN CHILDREN WITH AUTISM AND HOW MUSICAL SKILLS MAY BE AFFECTED

Remarkable skills, like perfect pitch or absolute pitch (AP), have been described in some autistic individuals with so-called savant abilities, which only make up 10% of the autism population (Frith, 2003:146, 150; Hill & Frith, 2003:282). Little is known about the musical ability of autistic children who have not been diagnosed with

savant autism (Heaton, 2009:1443). Different studies were conducted over a period, evaluating how autistic children respond to absolute pitch, rhythm and timbre (Applebaum, Egel, Koegel & Imhoff, 1979:280-281), perception of pitch (Heaton, Hermelin & Pring, 1998:296), and the descending and ascending of two-note pitch, as well as pitch contour (Heaton, 2005:791). These studies found that non-savant children with autism reacted positively to correct pitch identification. Applebaum et al. (1979:283) found that autistic children could identify pitch, rhythm and duration as well as or better in some scenarios than their typical counterparts. Studies demonstrated a positive outcome in pitch recognition in individuals with autism that are not a savant.

Frith (2003:150) argues that the ability to remember AP by all autistic musical savants and some autistic learners that are not musically trained may be due to the ability of the children to focus on small units and gradually build these units up to a vast knowledge in the specific area. Individuals with autism focus on detail, seeing the 'wood for the trees and not the trees for the wood' and find it exceptionally difficult to see the bigger picture or to put concepts together creating a whole (Hill & Frith, 2003:284). This is better known as Weak Central Coherence (WCC), which is a tendency to focus on the local, rather than global aspects of an object of interest (Hill & Frith, 2003:284). A test that children with autism are found to do well in is the Block Design test (Frith, 2003:141). This is a test that primarily focuses on an individual's spatial ability and requires a learner to copy an abstract, using smaller cubes in a limited time period (Frith, 2003:141). Although the primary concept tested in the Block Test is the spatial ability in a child, children on the spectrum do not necessarily succeed in the test because of spatial reasoning, but rather a strength (or weak central coherence) in focusing on the smaller segments and working from detail to gestalt. Happé and Vital (2009:1373) suggest that the ability to recognise pitch is not per se a talent, but rather the WCC that allows autistic children to remember pitch. Baron-Cohen, Ashwin, Ashwin, Tavassoli and Chakrabarti (2009:1377) claim that both the theories of WCC and Hyper-Systemizing postulate excellent attention to detail in individuals with autism, which may be the reason for good pitch identification.

The Hyper-Systemizing theory explains that the excellent attention to detail perceived in children with autism can be connected to ‘systemising’, which is the ability to connect a system of rules and get to an answer (Baron-Cohen et al., 2009:1377). In understanding cognitive processing and the different theories that examine these processing methods, one might get to an understanding of how individuals with autism get to specific answers. As suggested by Baron-Cohen et al. (2009:1379), “hyper-systemizing will affect not only how people with autism learn, but also how they should be assessed”. These strengths focusing on detail may be the reason these children succeed in identifying the correct pitch in small music segments while building a good pitch memory. Identifying and noticing the strength in children with autism, acknowledging what they are good at and understanding what they find difficult, enable teachers to adapt the teaching environment to benefit them. As stated by Stanutz, Wapnick and Burack (2014:146) in a study examining the pitch discrimination and melodic memory in children with autism, “Understanding developmental strengths in autism will be the first step in designing effective education systems for these children.” It can therefore be suggested that the success of piano lessons for autistic children can be in the understanding of how children with autism think and perceive concepts.

Theory of Mind (ToM) and Executive Dysfunction influence the thinking process of an autistic child (Hill & Frith, 2003:281). A lack of ToM, or mind-blindness, influences the way children perceive and understand social scenarios. They find it difficult to put themselves into someone else’s shoes or do mind-reading (Happé & Vital, 2009:1370). This is referred to as “mentalizing” by Uta Frith (2003:80) and described as the automatic deep, unconscious thought activity process of typical individuals. Children and adults with autism will often look at a life scenario or picture and find it difficult to read social cues, as well as to know what is expected of them in a social environment. Experimental tests have been conducted to understand ToM and the mental state of autistic children. The Executive Dysfunction theory, however, explains the behavioural problems that are characteristic of autism and cause rigid perseverance in planning, routine and actions (Hill & Frith, 2003:285).

The theoretical framework we use to understand the way these children perceive the world, whether WCC, hyper-systemising, ToM or executive dysfunction, can affect

the way we think about their capacity and how we approach them in a learning environment (Baron-Cohen et al., 2009:1380). This can help with the effective adaption of teaching methods to benefit the child on the spectrum and to understand why they react as they do in a specific scenario. Not only does the perception and understanding of concepts and academic work influence their behaviour, but autism often co-occurs with sensory sensitivity (hyper- or hypo-reactivity) to the environment.

2.3 SENSORY SENSITIVITY AND HOW PHYSICAL EXERCISES CAN BE USED TO BENEFIT INDIVIDUALS WITH AUTISM DURING CLASS ACTIVITIES

A multiple of sensory information is observed daily in the sensory system, and when distortion in the sensory input occurs a variety of behavioural and learning problems manifest both in social interaction (Little et al., 2015:2986) and in the school environment (Howe & Stagg, 2016:1663). According to Kern, Trivedi, Grannemann, Garver, Johnson, Andrews, Savla, Mehta and Schroeder (2007:124), sensory dysfunction results from the brain's inability to correctly process stimuli from sensory input including vision, hearing, touch, taste, smell, vestibular, proprioception and kinaesthetic response. Sensory hypersensitivity has been noticed consistently among individuals with autism (Howe & Stagg, 2016:1656; Little et al., 2015:2981; Frith, 2003:170), as well as other diagnoses of disabilities (Rogers & Ozonoff, 2005:1264). In the new edition of the DSM-5 (APA, 2013:50), hyper-or hypo-reactivity to sensory input has been included in the criteria for the diagnoses of autism under restricted, repetitive behaviours domain criteria.

In *Teaching students with Autism: A resource guide for schools* (Garside et al., 2000:35-36) it is explained how hyper-reactivity differs from hypo-reactivity in sensory sensitivity. Hyper-reactivity in the auditory system can result in individuals being easily distracted by background noise. Individuals may hold their hands over their ears or scream to block out the sound and react physically as if it causes pain. Hypo-reactivity may cause children not to respond to their name and to seem oblivious to the sound of surrounding activities. It may cause children to create constant sounds for self-stimulation. Hyper- or hypo-reactivity manifests in different

ways in each of the senses, including the visual system, tactile system, vestibular system and gustatory/olfactory system.

Sensory dysfunction is found to co-occur 80% of the time in children diagnosed with autism (Ben-Sasson, Hen, Fluss, Cermak, Engel-Yeger & Gal, 2009:3). This sensory sensitivity causes anxiety and stress in parents, caregivers and teachers who are responsible for the optimal development of the child (Schaaf, Toth-Cohen, Johnson, Outten & Benevides, 2011:386). It is thus vital to understand how sensory sensitivity affects individuals and causes a deficit in their social and cognitive development. Sensory sensitivity often makes it difficult for individuals to adapt to an environment that is loaded with sensory information (Little et al., 2015:2986; Schaaf et al., 2011:385). Individuals with a higher level of sensory sensitivity (hyper-reactivity) are more likely to withdraw from social events and would instead participate in a controlled environment where sensory sensitivity, such as noise (unpredictable reaction to sound) and/or light (disturbed by bright lighting and avoids sunlight) is controlled (Little et al., 2015:2986; Schaaf et al., 2011:385). Individuals with a lower level of sensitivity (hypo-reactivity) are found to participate more frequently in social events, whereas individuals with hyper-reactivity and sensory-seeking behaviour, which is the need for specific stimuli such as movement and touch, will often not participate in outdoor social events (Little et al., 2015:2987).

In a study by Howe and Stagg (2016:1656) autistic adolescents found it difficult to concentrate in a classroom, as their primary focus was on the sensory stimuli disturbance and not on the work concept discussed at the school. The majority of participants experienced sensory issues related to hearing (88%), followed by touch (75%), vision (50%) and smell (35%) (Howe & Stagg, 2016:1660). Sensory sensitivity was found to have had an effect on the autistic learner's learning in class, including a reduction in concentration, along with being anxious or uncomfortable, and in some cases, participants explained that sensory sensitivity caused them to experience physical discomfort (Howe & Stagg, 2016:1661-1662). Learners found it difficult to concentrate in a classroom, as their primary focus was on the sensory stimuli disturbance and not on the work concepts discussed in the classroom. It seems important to consider the effect that sensory sensitivity has on autistic

individuals, as playing the piano involves different sensory stimuli input that may affect the learner negatively.

Children with autism experience difficulty expressing high levels of anxiety due to a deficit in communication and social reciprocity. Various methods have been studied and applied in therapy and classroom interventions to benefit a child with autism. Case-Smith, Weaver & Fristad (2014:133-148) evaluated two therapy techniques used to help children with autism; sensory integration therapy (SIT) and sensory-based intervention (SBI). Sensory integration therapy used by a qualified occupational therapist is sensory rich and focuses on play skills, based on direct child activities between the therapist and the child to enhance the child's ability to self-regulate sensory sensitivity, whereas SBI is primarily used by teachers and parents to influence a child's state of behaviour in class. These activities are primarily single-sensory strategies such as a therapy ball, swinging and bouncing (Case-Smith et al., 2014:135). It was found that SIT was more beneficial, as it was directed towards the child's personal needs, whereas a lack of effectiveness was noticed in SBI, which was primarily embedded in the child's everyday routine and school environment and was not goal orientated to benefit the child's specific sensory needs (Case-Smith et al., 2014:144). Parents and teachers who are guided by a professional, such as a qualified occupational therapist who works daily with the autistic child, might be more successful practising recommended sensory activities at home or in class that benefit the specific child. According to Schaaf et al. (2011:388),

> Professionals working with children with autism should recognise that each child will have individual sensory needs and behaviour and a thorough assessment of sensory processing should be utilized to guide the professional and the parent in their choices of activities and modification.

The acknowledgement and understanding of sensory sensitivity stimuli, along with goal-orientated exercises to allow self-regulation, may benefit and enhance individuals' development and participation in an activity. It was found that physical activities and play skill interventions benefited a child with autism (Crollick, Mancil & Stopka, 2006:34), increasing the value of life while maintaining a more focused, productive and effective lifestyle (Geslak, 2016:36). Exercises were often used to

strengthen a child's muscles to improve muscle coordination, develop balance and kinaesthetic awareness (Crollick et al., 2006:33).

Physical exercise programmes have been explored to evaluate the benefit of exercises on children with autism. Improvement in task behaviour, academic responding and an increase in self-stimulation were noted (Lang, Koegel, Ashbaugh, Regester, Ence & Smith, 2010:574). Crollick et al. (2006:32) suggest that physical exercises and play skills should be used in conjunction with activities and approaches implemented in occupational therapy, to create an optimal environment for physical exercises. Enjoyable and fun-like exercises can therefore be incorporated into everyday routine to strengthen muscle tone, improve muscle coordination (Crollick et al., 2006:33) and to allow sensory-sensitive children to participate in a self-regulation activity. Incorporating physical activity during piano lessons can be helpful and benefit the learner in various ways (Garside et al., 2000:34).

2.4 CONCLUSION

An in-depth understanding of autism as well as comorbidities is important to adapt the teaching material and environment according to the learner's need minimising anxiety. To understand better how autistic learners process information, the different theories explaining the cognitive thinking processes must be studied, so that piano concepts can be presented in a way that will increase the learner's understanding of musical ideas.

It is also necessary to understand how comorbidities such as cognitive impairment and ADHD, along with sensory sensitivity, can influence the learning environment. Teachers should be equipped with the required knowledge to help learners with sensory hypersensitivity, for example, using earplugs to block out sound or remove a colourful rug from the classroom.

Although it is vital to have a thorough understanding of autism, it is also essential to know how autistic children react to music and what effect it might have on the individual. In the following chapter, music interventions, as well as teaching methods that were found beneficial to teach autistic children at school will be discussed.

CHAPTER 3: THE INFLUENCE OF MUSIC INTERVENTION, SENSORY SENSITIVITY, TEACHING METHODS AND VYGOTSKY'S EDUCATION THEORY

The second half of the literature review will examine the use of music therapy and intervention in the education and therapeutic environment. It will look at the impact that music has on the emotional state of autistic children as well as the challenges and strengths in the education domain. Vygotsky's Educational Theory will be examined to create a framework within which piano lessons can be given. The specific theory considers a shared-joined process between the teacher and learner that is relevant to this study (Gindis, 1999:334). Lessons will be given one-on-one working from the individual learners level of understanding towards new piano concepts. Teaching methods specifically for autistic children in both the inclusive and music classroom will be evaluated, as well as established music teaching methods.

3.1 THE USE OF MUSIC THERAPY AND INTERVENTION IN THE EDUCATION AND THERAPEUTIC ENVIRONMENT

The American Music Therapy Association (AMTA, 2014) defines music therapy as "the clinical and evidence-based use of music interventions to accomplish individualised goals within a therapeutic relationship by a credentialed professional who has completed an approved music therapy program". While music as a therapeutic intervention "is used to stimulate functional areas of the brain during therapy" (De Vries et al., 2015:223-224), non-music therapists such as educators and psychologists also use music in class or therapy to evaluate the effect of music intervention on individuals.

Both non-experimental and experimental data were collected in the review of the literature to evaluate the benefit of music to autistic children. Music therapy and music as a 'therapeutic' intervention have been found to benefit learners with autism. A number of systematic literature reviews were conducted to investigate and evaluate the effect that music intervention and music as a therapeutic intervention have on children with autism and how they improve development in specific areas

(De Vries et al., 2015:229; Whipple, 2004:102). Some of these areas include an increase in attention to tasks; reduction in anxiety; enhanced body awareness and coordination (Whipple, 2004:102); improvement in social behaviour; and an increase in both communication reciprocity and vocabulary comprehension (De Vries et al., 2015:229; Whipple, 2004:102).

As explained in previous paragraphs, impairment in social communication, interaction and reciprocity, along with restricted, repetitive behaviour, makes it difficult for individuals on the spectrum to engage socially with peers. Children diagnosed with autism often have a high level of anxiety, a low self-esteem and experience difficulty in relationships. A study was conducted over a period of eight weeks during an interdisciplinary program between music education learners and learners majoring in psychology. Individuals diagnosed with high-functioning autism were placed in smaller groups where they engaged in a range of music activities, which included creating a short film with accompanying music composed on the GarageBand app. The use of music and technology revealed a positive psychological outcome, as individuals showed lower levels of anxiety, higher levels of self-esteem and a positive attitude towards peers and relationships (Hillier, Greher, Poto & Dougherty, 2011:209).

Music therapists also found that playing or singing a child's favourite song increased the child's participation, social behaviour and transition into different environments positively (Finnegan & Starr, 2010:339; Kern et al., 2006:1270). Finnegan and Starr (2010:339) noted an increase in eye contact and a higher percentage of both imitation and turn taking during the play activity when music was incorporated. The child's level of happiness was observed during the play activities and it was noted that the child seemed happier, smiled more often and laughed appropriately with the inclusion of music. The incorporation of music during play activities in social behaviour (Finnegan & Starr, 2010:339-341) and the morning greeting in the facilitation of independence (Kern et al., 2006:1269) showed a positive outcome for individuals with autism.

In conclusion, Whipple (2004:102-103) states, "Music appears to be so powerful a tool with this population that regardless of its purpose or how it is used for a

particular client, it achieves positive effects". It has been noticed that music has a positive effect on children, adolescents and adults diagnosed with autism. With the proper adaptation of piano teaching methods, learners may not only learn how to play the piano, but various psychological outcomes may also be a result that will benefit the child in everyday life.

3.2 THE IMPACT OF MUSIC ON THE EMOTIONAL STATE OF AN INDIVIDUAL DIAGNOSED WITH AUTISM

Individuals diagnosed with autism often experience difficulty identifying and communicating their emotions. This is better known as alexithymia (Allen & Heaton, 2010:254). Alexithymia type II is often seen as comorbidity with autism and other disorders (Hill, Berthoz & Frith, 2004:229, 233-234; Sifneos, 1973:256, 259). It is the ability to feel the emotion, but inability to describe it (Bermond, 1997:124; Sifneos, 1973:256, 259). A study by Allen, Hill and Heaton (2009:31-36) shows that individuals with autism are sensitive to music's social and emotional dimension, but experience difficulty in verbalising their emotions, preferring to describe the characteristics of music or musical arousal.

To evaluate how individuals with autism perceive music and emotions, Allen et al. (2009:21) conducted research measuring the emotional effect of music. It was found that individuals on the spectrum listen to music for various reasons. For example, some individuals listen to music to counter anxiety/tension and create a sense of relaxation/calmness or excitement/exhilaration. Others listen for the pleasure of the structure of the music for therapeutic reasons, while yet others experience a feeling of belonging to a 'bigger' group, overcoming the feeling of loneliness (Allen et al., 2009:26-28). In a study by Quintin, Bhatara, Poissant, Fombonne and Levitin (2011:1244), high-functioning adults with autism were asked to associate music with line-drawn faces. Individuals could recognise basic emotions such as happiness, sadness and fear, but found it extremely difficult to identify and connect more complicated emotions such as peacefulness (Quintin et al., 2011:1249). It was concluded that listening to music and participating in music programs can help individuals with autism to channel their emotions and express their feelings (Quintin et al., 2011:1251).

Literature reveals that autistic children react positively to music and often enjoy participating in a music activity. If this information is kept in mind while teaching children to play the piano, they may enjoy taking part in the music lessons. However, it is important that the clinical features and comorbidity, such as sensory input and ADHD, be taken into consideration, as it can complicate the learning environment.

3.3 CHALLENGES AND STRENGTHS IN THE EDUCATION DOMAIN OF AUTISM SPECTRUM DISORDER CHILDREN

The functioning of the mind and cognitive ability influence the learning outcome in class, as “specific learning difficulties such as literacy and numeracy are common” (APA, 2013:59). When teaching children on the spectrum, the different comorbidities that occur which often influence the child’s learning ability, should be kept in mind (APA, 2013:58). Children diagnosed with autism learn predominantly with visual support, along with simplified oral instruction (Garside et al., 2000:27, 40, 42; Darrow, 2009:25; Deris & Di Carlo, 2013:55; Harrower & Dunlap, 2001:767). The reason for the specific learning strength (as discussed in Chapter 2), might be connected to the different cognitive styles of thinking that can be connected to the theory of Weak Central Coherence (WCC) (Hill & Frith, 2003:284), executive dysfunctioning (Hill & Frith, 2003:285), ToM (Frith, 2003:82) and hyper-systemising (Baron-Cohen et al., 2009:1380). It can then be deducted that keeping the cognitive styles in mind while preparing the piano lessons and using learning material such as visual aids might help learners to understand music concepts taught in piano. Visual images such as a bird for high and a frog for low can be used to explain sounds on the piano.

People with autism seem to have superior rote-memory skills, although fragmented, lacking understanding and meaning, as they can recall random sequences (timetable schedules, dates, numbers) without the ability to apply information in real life scenarios (Frith, 2003:145, 156-157). Regardless of their superior ability to memorise random information, children diagnosed with autism experience difficulty in learning and comprehending new knowledge by rote learning. The challenges that autistic learners experience with rote learning may be explained by a study conducted by Randi, Newman and Grigorenko (2010:1), examining what makes

reading with meaning difficult for children with autism. Although the study is an example of language comprehension, it can be extrapolated to music learning. Randi et al. (2010:6) explain that, to read with understanding, previously memorised words should be placed within an organisational structured manner to aid memory. However, children with autism find it challenging to support memory, since cognitive structural strategies are impaired (Williams, Goldstein & Minshew, 2006:3-4). They also find it difficult to learn through rote learning, as they cannot place the memorised, fragmented information into a bigger picture or structure like playing the piano.

The inability to learn through rote learning may cause difficulty in piano lessons, as music pieces are often taught in this way. A different approach should be considered adapting a familiar technique or work material to benefit the autistic learner (Scott, 2014:7). Piano teachers may be advised to consult with parents in this exercise, as parents are often a great resource in establishing what works best for the child, what may cause anxiety and frustration (Deris & Di Carlo, 2013:53), and how to bring the child out of their chosen isolation into the classroom (Hourigan & Hourigan, 2009:41).

Previous studies showed that autistic children do not spontaneously learn through observation (Varni, Lovaas, Koegel & Everette, 1979:41). They have deficits in imitating specific tasks (Ingersoll, 2007:275; Sooray, Arnstein, Gillis & Romanczyk, 2003:119; Rogers, Bennett, McEvoy & Pennington, 1996:2072), and have to be trained how to imitate with continuous reinforcement (Baer, Peterson & Sherman, 1967:415). Although these tasks are not based on music or playing a musical instrument, motoric and gestural imitation is used in piano lessons. Music teachers often use teaching materials based on approaches using imitation and rote learning (Scott, 2014:1). These music teaching approaches may be troublesome in piano lessons, where various imitation techniques are used to teach learners the correct technique necessary to play the instrument. Teachers may demonstrate the desired technique that they want the learner to imitate such as the flexible wrist movement or a graceful wrist motion used to move from one group of black keys to the next.

According to Sooray et al. (2003:119), imitation often creates problems in the learning environment, as autistic children experience difficulty acquiring social skills and concepts taught through imitation and observation alone. Imitation is an essential skill used in music lessons, as learners are expected to imitate specific hand movements, techniques and good body gestures for example. Ingersoll (2007:275) mentions that children on the spectrum find it challenging to imitate non-meaningful gestures that occur in socialising [or in a class]. The lack of imitating another person's actions affects a child's development (Scott, 2014:3).

Vanvuchelen, Roeyers and De Weerdt (2007:235) note that children diagnosed with autism are more likely to imitate meaningful gestures, such as pretending to comb one's hair, than non-meaningful gestures. Meaningful gestures might be better understood, as the child might have a similar experience to the familiar gesture and can recall the action. Along with structured guidance and visual support, these children may be able to imitate meaningful gestures relevant to playing the piano. Rogers et al. (1996:2069) found that autistic children have a deficit in motor imitation such as hand, face and pantomime imitation.

A deficit in motor imitation can cause difficulty in acquiring a good piano technique, such as keeping a rounded hand shape, playing with firm fingertips and a flexible wrist. With practice and continuous reinforcement children may develop these techniques during a structured piano lesson. The challenge to mimic particular movements may affect playing or learning to play the piano.

Live modelling (Ergenekon, Tekin-Iftar, Kapan & Akmanoglu, 2014:200), video modelling (Sancho, Sidener & Reeve, 2010:436; Corbett, 2003:368,369) and video prompting (Domire & Wolfe, 2014:220) have been found to be successful teaching methods for teaching learners with autism and other developmental disabilities, important life skills and concepts. Live modelling teaches behaviour in sequence to autistic children, allowing learners to observe and imitate new concepts (Ergenekon et al., 2014:201), whereas video modelling is a technique involving the learner to observe a video of a model showing the desired action to be practised (Ergenekon et al., 2014:200; Corbett, 2003:268). Video prompting only shows one step of the task, minimising additional information such as the model participating, and exclusively

focuses on the action being taught, allowing the learner to see the hands and how he/she should practise the movement before continuing to the next step of the task (Cannella-Malone, Sigafoos, O'Reilly, de la Cruz, Edrisinha & Lancioni, 2006:345, 347).

A study by Ergenekon et al. (2014:203-206) found that live modelling and video modelling were equally effective. This may, however, depend on the individual's learning preference and not necessarily on the technique itself. Video modelling can be two minutes in duration, with five seconds between each video modelling clip (Sancho et al., 2010:424), whereas video prompting is no more than 30 seconds in length (Cannella-Malone et al., 2006:348). The differences between the prompting and modelling videoclips were the perspective of the viewer and the length of the videoclip. In two individual studies by Domire and Wolfe (2014:223), and Cannella-Malone et al. (2006:348), individuals responded better to video prompting, as it proved to be more helpful than video modelling due to the short duration of the videoclips.

The effectiveness and efficiency of video prompting and picture prompting were evaluated. Video prompting was found to be more effective, because it broke target skills and instructions down into simple steps that could easily be followed by the learner (Van Laarhoven, Kraus, Karpman, Nizzi & Valentino, 2010:205). The effectiveness of the video prompting could be because of the WCC (Hill & Frith, 2003:284) or hyper-systemising theory (Baron-Cohen et al., 2009:1377), as learners gave excellent attention to detail. Life modelling, video modelling and video prompting could be used in my study to reinforce piano concepts at home.

It was found that prompting strategies are often used in class. They are important elements in teaching autistic learners and can be physical, gestural or verbal (Garside et al., 2000:32). Physical prompts are used when the teacher guides the learner hand-on-hand and shows a learner how to do an activity, whereas gestural prompts include pointing to a picture or item and verbal prompts tells a child what to do (TEACCH Staff, 2000). Prompts have been found to be successful in teaching a specific academic or behavioural activity and should be used to supplement the general instruction routine (Harrower & Dunlap, 2001:766).

3.4 VYGOTSKY'S EDUCATION THEORY

Lev Vygotsky's Education theory is widely known for describing educational processes in children as a social construct. He stressed the central role that social interaction plays in the development of cognition. Over the years, teachers and parents have used various educational approaches to teach children. These were usually implicitly or explicitly adopted to create an optimal learning environment for children (Karpov, 2014:1).

Vygotsky's theory was born out of the connection between sociocultural processes taking place in society and the mental processes in the individual (Gindis, 1999:333). He considered learning as a shared-joined process between a mentor and a child in a responsive social context (Gindis, 1999:334). Although children gained information from their parents and the social environment for centuries, Vygotsky placed the teaching-learning process between an adult and child in a theoretical framework known as the Zone of Proximal Development (ZPD). The ZPD encompassed the idea that learning and development are the results of the adult intervention. Thus the interaction between a mentor and a child (Chaiklin, 2003:41), with the mentor guiding the child in age-appropriate activities, teaches the child new skills of thinking, problem-solving and self-regulation (Karpov, 2014:19, 29). Self-regulation can be referred to as the child being equipped to guide him or herself through the thinking process and social situations, as he or she has noticed the mentor do during the age-appropriate activities (Karpov, 2014:70-72, 91,185).

The ZPD can be divided into three different categories, namely generality, assistance and potential assumption (Chaiklin, 2003:41). Generality assumption (Chaiklin, 2003:42-43) refers to instruction that is aimed towards the child's full development in a specific area, giving structured guidance in specialised, technical skills needed to type, ride a bicycle or play the piano for instance. The primary focus of the ZPD is not necessarily on a specific skill, but rather related to the development of the child. While assistance assumption values the importance of a competent mentor to instruct the child, the focus is not on the competence of the knowledgeable person, but rather "to understand the meaning of the assistance in relation to a child's learning or development" (Chaiklin, 2003:43). Potential assumption focuses

on the learner's potential and readiness to learn, as the learning environment may not always be ideal (for example, a child that does not win a race), but certain maturing functions may be present, allowing for meaningful, interventive action (Chaiklin, 2003:43). When in the ZPD, the emphasis is not on how much the competent person knows, but rather on building on the child's existing knowledge of the subject.

Optimal development takes place when the developmental maturity level of the child and the activity they participate in are on the same level (Chaiklin, 2003:43). When teaching a child, all three these assumptions should be taken into consideration creating a Zone of Proximal Development for the child. The Zone of Proximal Development (ZPD) can be used for two different purposes; firstly, to identify the maturing developmental functions within a child that are needed to make a transition from one level of developmental maturity to another level. The other is to identify a child's current state in relation to developing these functions needed for the transitions (Chaiklin, 2003:49). In the ZPD, Vygotsky desires to create a theoretical framework for the appropriate pedagogical interventions to assist teachers in developing an optimal learning environment for children (Chaiklin, 2003:51), motivating a child to learn new work, to understand where the child is and to work from the child's current understanding towards incorporating new skills and concepts.

The Vygotskian framework allows for optimal learning, as children are capable of a far more competent performance when they have proper assessment and guidance from parents or adults that guide them through age-appropriate learning events (Gindis, 1999:334; Chaiklin, 2003:43). His theory suggests that, with the correct knowledge, the adaptation of piano teaching methods, together with minimising sensory input, could help autistic children to reach their highest level of potential in playing the piano. In a study done by Gindis (1999:334) he mentions one of Vygotsky's (1995) articles about the Vygotskian education theory for children diagnosed with various disabilities. Vygotsky placed emphasis on the optimal and proximal development of children with disabilities and noticed in his theoretical framework of sociocultural development that children with different disorders find it difficult to socialise (Gindis, 1999:335). Social impairment is especially true of

individuals diagnosed with autism or other behavioural disorders that affect their influence with other people. According to Vygotsky's theory (Gindis, 1999:337), “Special education programs should have the same sociocultural goals as general education programs,” allowing learners to engage with other peers and creating reciprocal interaction between the autistic learner and a mentor.

A variety of interventions has been used previously among adults and children with autism and was found to be successful, as long as the environment and intervention were adapted according to the learners’ need. When changing the environment, the focus should be on addressing the “secondary disability syndrome; that is, countering the negative social consequence of the primary disability” (Gindis, 1999:337-338). This might not be true of teaching autistic children one-on-one that might find individual lessons more beneficial than group work, as it minimises social and communication pressure. Teaching a child with autism will require of the teacher, parent and caregiver to consider the different comorbidities as well as sensory sensitivity that may influence the teaching environment.

Vygotsky constructed his theory of the ZPD around imitation. It is therefore vital to understand what he meant by imitation. He referred to imitation as the level of understanding that the learner has towards a problem that is solved, not imitation in expecting someone to copy a specific movement, behaviour or action, but rather an active, cognitive learning process (Chaiklin, 2003:51-52). Imitation is found to be an essential method where children learn new concepts from society and in the classroom. It can be suggested that they may not yet be able to learn new concepts or learn to play the piano if the child has not developed the necessary cognitive maturity level needed. Children with autism experience more difficulty to imitate meaningless behaviour than behaviour that was conducted at their level of meaning and understanding. When participating in age-appropriate activities and interventions between an adult and child, the child can only imitate if they have already developed the appropriate level of maturity needed to acquire a new skill (Chaiklin, 2003:53). It is thus necessary to look at each learner’s personal development and teach from his/her level of understanding (Karpov, 2014:144).

When seeking a ZPD, the child's understanding of the specific subject matter should be taken into consideration as well as the level of difficulty of the teaching material. Learning material that is not based on existing knowledge may seem irrelevant and not be learned by the learner (Karpov, 2014:146). By allowing learners to enjoy a certain freedom in making their own choices in the class, context can make the learning process more interesting for the learner (Karpov, 2014:146). In the theoretical learning approach developed by Vygotskian followers, the learners should be provided with a general procedure for solving subject-domain problems (Karpov, 2014:25, 186-187). The procedure can be in the form of a chart, symbols or a graphics model to guide and lead the learner through the process of problem-solving in the specific subject area (Karpov, 2014:186-191), asking direct questions towards the problem-solving area. In the case of this study, the problem area will be in musical understanding and be able to read basic music pieces. It is therefore essential to equip learners with factual and conceptual knowledge of the specific subject, for example, identifying black and white keys, and identifying left hand and right hand so that they can participate in the problem-solving process.

The Vygotskian theoretical learning approach minimises the use of rote memorising and rote learning as individuals are given a visual chart and written definition of the procedure used, guiding them through the problem-solving process (Karpov, 2014:146, 201). The review of the literature reveals that children diagnosed with autism find it difficult to learn through rote learning, thus using a general procedure may be more beneficial to the autistic child.

Using the Vygotskian theoretical learning approach, along with additional visual concepts can, therefore, be beneficial in teaching autistic children to play the piano. The Vygotskian framework has been chosen for my study, as the theory considers learning a shared joined process between the mentor (piano teacher) and the learner. In the ZPD, learning and development of the child are the results of the adult intervention. The child is taught new music skills in a structured manner while building on previously explained piano knowledge and develops confidence and a level of independence at the instrument with mentor guidance. An autistic learner may not know how to play the piano, but will learn about the keyboard from his/her existing understanding of the black and white colour, and then connect it to the keys.

With the right assistance, advice and adapted teaching methods, children are more likely to be capable of more competent performance, while the Vygotskian theoretical learning approach provides the learners with a visual, structured, supported chart or graphic model asking learner simple, clear and direct questions, which guide learners to get to the desired answer (how to play a music piece).

3.5 TEACHING METHODS SPECIFIC TO AUTISTIC CHILDREN

Due to a scarcity in the study field of piano teaching methods for children diagnosed with autism, teaching methods used in the inclusive classroom and music classroom have been included. These methods were examined and evaluated to adjust piano lessons adequately. Literature regarding 'other' disabilities has also been used, as it was found that articles regarding different disabilities often include a segment regarding autism and how to adapt the teaching methods for children diagnosed with autism.[12] The review of the literature revealed specific methods and teaching methods that work effectively for children on the spectrum, both in the inclusive classroom and in the music classroom (Darrow, 2009:25; Deris & Di Carlo, 2013:55; Hourigan & Hourigan, 2009:41).

3.5.1 The inclusive classroom

Children diagnosed with autism experience difficulty understanding learning material and the adaptation of teaching strategies and classroom modifications are necessary for facilitating success among learners (Deris & Di Carlo, 2013:52). Two critical aspects in the classroom are the material used and how the teacher organises the physical space in the environment (Deris & Di Carlo, 2013:52). A clear, well-organised workspace decreases stress levels and allows for better focus and concentration on the activity (Deris & Di Carlo, 2013:53). A quiet area is

[12] For the purpose of this section, the review of literature was limited to the English language and obtained by searching databases and journals (myJSTOR, EBSCOhost, Education Research Information Centre [ERIC], SAGE, PsychARTICLES and the Journal of American Music Teacher). Databases were searched with the following terms: music and autism; music education and autism; piano teaching and autism; video prompting; video modelling; imitation and autism; autism and inclusive classroom; autism and inclusive music classroom.

recommended, allowing learners to move away from the classroom routine or activity (Deris & Di Carlo, 2013:53; Willis, 2009:87). Teachers should prepare the learner for the class activities before the lesson by using pictures or line drawings in sequential order so that learners are acquainted with the schedule (Deris & Di Carlo, 2013:53; Willis, 2009:86,88; Harrower & Dunlap, 2001:767; Garside et al., 2000:28). Notice should be given in advance to learners if there is a change in the usual lesson plan (Deris & Di Carlo, 2013:53). This allows learners to process the information in advance and minimise anxiety.

Stokes, Thomson, Macmillan, Pecora, Dymond and Donaldson (2017:202-203) found that teachers use a structure in the form of consistency, concrete instruction and timetables to minimise disruptive behaviour. Both structural and visual material is essential when teaching autistic learners. Teaching material such as play materials, concrete activities, worksheets, and schedules should be organised from a left-to-right, top-to-bottom system reinforcing pre-reading and pre-writing skills (Deris & Di Carlo, 2013:55; TEACCH Staff, 2000). The repetition of left-to-right, top-to-bottom allows learners to solidify the learning material and understand the expectations better, developing independence as the teacher demonstrates the desired action and use of learning material. When the learner becomes more proficient, the teacher phases out the use of prompts and encourages independence (Deris & Di Carlo 2013:53). Choice-making opportunities, which are highly motivational, should be incorporated during the lesson, fostering independence as learners take more control (Deris & Di Carlo, 2013:53) and get an opportunity to make their own decisions (Garside et al. 2000:30).

Deris and Di Carlo (2013:53) advise that teachers should use schedules to provide routine in class. A piano lesson routine structured from top to bottom can be created, preparing learners for what they will be doing in class. Choice-making opportunities can be included, giving learners the opportunity to decide whether they would like to do the last piano activity for the day or would prefer to continue the following week.

The use of multiple communication methods, including visual aids, visual gazes and hand gestures (sign language), should be incorporated in lessons accompanied by spoken instruction (Deris & Di Carlo, 2013:53,55; Hammel & Hourigan, 2013:109-

110; Hourigan & Hourigan, 2009:42; Willis, 2000:85; Garside et al., 2000:27). Deficits in communication and social reciprocity are characteristics of children with autism and affect a child's learning ability (APA 2013:50, 59). Communication devices such as computer-like tools, for example iPads, are often used when a learner is non-verbal (Willis, 2009:85).

A sign language programme called *The Makaton Vocabulary* was designed to help individuals with severe communication and cognitive impairments (Walker 1981:1). However, today it is used for both mentally and/or physically handicapped individuals as well as severe communication deficits (Walker 1981:2). It is used in conjunction with spoken language and uses pictures, signs, symbols, objects or any alternative form of communication to help reinforce the meaning, allowing instructors, teachers and parents to immediately use the sign language, as it focuses on core words and not grammatical structure (Walker, 1981:2, 4). Makaton sign language, with the support of visual images, will be used during lessons to reinforce music concepts and words such as *Soft, Loud, Finish* (meaning Double Bar Line), *No, Yes*, and *Sit Down.*

The abstract Italian dynamics *forte* and *piano* can be explained during the piano lessons using concrete toy animals. The child will be asked to identify if the animal will make a loud (*forte)* or a soft (*piano)* sound, connecting it with the correct Italian symbol and then play the sound on the piano. The concrete plastic animal will be replaced with images, with the abstract image next to it before connecting it only with the abstract symbols.

Teachers often use visual aids in class (Deris & Di Carlo, 2013:55; Stokes et al., 2017:202). Visual material and direction can be used for a period until the learner has processed the information, while oral instruction is transient (Hammel & Hourigan, 2013:109; Garside et al., 2000:27). The type of visual material depends on the learners' level of comprehension and can vary from photographs, coloured pictures, line drawings and concrete objects to abstract context (Deris & Di Carlo 2013:55-56; Garside et al., 2000:27-28).

Tasks should be assigned according to the learners' level of understanding and physical ability, as they may experience anxiety and feelings of frustration if the

activity seems too difficult (Garside et al., 2000:29). Complex tasks and concepts should be broken down into subtasks and taught in small segments that should be reinforced in sequence until the learner is confident enough to put the different subtasks together (Garside et al., 2000:31).

Direct praise and meaningful reinforcement should be applied during the lesson. Reinforcement can vary from positive praise to tangible objects or activities to motivate learners (Garside et al., 2000:29). Learning material can include topics that the individual learner finds interesting or is fixated on. This may involve toys or a topic such as colour (Deris & Di Carlo, 2013:55; Garside et al., 2000:34). Including topics of interest can be highly motivational to the individual. Anxiety, boredom and inappropriate behaviour can be minimised during lessons by adding physical exercises and activities into the schedule (Garside et al., 2000:34). Additional physical and hand exercises can be included in piano lessons, strengthening the crucial muscles necessary for playing the instrument. The additional physical and hand exercises can consist of tossing and squeezing a stress ball.

It may be beneficial to keep sensory stimuli to a minimum in the class. Specific sensory input such as high noise levels, tactile, smell and visual stimulation (the class may be too colourful, or have a lot of different patterns on the walls, carpet and curtains) may have an adverse effect and trigger negative behaviour, outbursts, tantrums or meltdowns (Deris & Di Carlo, 2013:53; Willis, 2009:85). It is therefore important to gain information from parents and caregivers to adjust the environment effectively for an individual child (Deris & Di Carlo, 2013:53). Some learners may have sensory-seeking behaviour and need sensory input, such as moving around, swinging or jumping, at regular intervals to be able to focus on learning tasks (Deris & Di Carlo, 2013:54). Activities such as crawling and playing with a ball can be included during the piano lessons.

3.5.2 The music classroom

In the music classroom, it is particularly important to consider sensory input, as making music involves all the sensory stimuli, except olfactory (smell) and gustatory integration (taste) (Hammel & Hourigan, 2013:44, 104). In *Teaching music to*

learners with autism, Hammel and Hourigan (2013:103-113) explain the importance of adapting the environment to the learners' sensory sensitivity in the inclusive music classroom. They explain how walking down a flight of stairs requires that the visual, tactile, vestibular (movement and balance) and proprioceptive (body position) systems all work together. The same may apply when teaching children with autism to play the piano, as different sensory input is involved including the sound of the piano, the tactile feel of the keys and moving the hands up or down the keyboard.

Tactile challenges in the class may cause some learners to pull away, avoiding touch or holding objects, while others may have poor tactile discrimination and experience difficulty in understanding how things feel (Hammel & Hourigan, 2013:104-105). It is essential to understand how individual learners react to specific sensory input and to adapt the environment and lesson material accordingly. Self-stimulating sensory behaviour, such as flapping hands, should be taken into consideration during a lesson, as it often has a calming effect on the learners sensory-motor system (Hammel & Hourigan, 2013:112). Learners respond and process sensory information in different ways, often reacting inappropriately, atypically and aggressively, which can disrupt the classroom (Darrow, 2009:24-25; Hourigan & Hourigan, 2009:42). It is therefore vital to keep sensory information in mind when teaching, since making music is a form of sensory input (Hourigan & Hourigan, 2009:44).

Music and movement often go together, causing difficulty in the vestibular and proprioceptive system. Dysfunction in the vestibular system causes challenges in basic motor movements, such as hand signs, dance movements and finger games (Hammel & Hourigan, 2013:106). Learners experiencing hyper-reactivity in the vestibular system may appear intolerant and avoid music activities involving dancing and movement, whereas learners experiencing hypo-reactivity in the vestibular system may crave spinning, rocking or jumping (Hammel & Hourigan, 2013:106-107). Challenges in the proprioceptive system may cause learners to be uncoordinated and they may find simple tasks such as jumping or putting on shoes difficult (Hammel & Hourigan, 2013:106). Learners experiencing challenges in the tactile, vestibular and proprioceptive system may find it difficult during lessons to learn piano techniques such as hand coordination, individual finger movement, dynamics and keeping a good posture.

Visual dysfunction may occur in the form of sensitivity to light (halogen) or difficulty in shifting focus. Learners may struggle with visual orientation and find the black notes printed on white paper challenging to read (Hammel & Hourigan, 2013:108). Hammel and Hourigan (2013:108) found that placing a transparency over the paper might soften the page, thus helping the learner to read choral octavos[13]. Auditory sensitivity can be problematic in a music classroom and could be minimised using headphones to block out noise or asking peers to speak softly. Learners often complete theory worksheets incorrectly, as they do not understand the specifics of the assignment. A successful strategy is to use visual directions in the form of written or pictorial information with simplified oral instruction guiding learners through the work (Darrow, 2009:25; Hammel & Hourigan, 2013:109; Hourigan & Hourigan, 2009:41).

Motor planning also known as dyspraxia is another area of dysfunction that interferes with how an individual interacts with the physical environment and plan the actions necessary to complete a goal such as getting dressed or making a sandwich (Hammel & Hourigan, 2013:110; Kranowitz, 2006:7). Kranowitz (2006:6) explains dyspraxia (dysfunction in praxia) as the "difficulty conceiving of, planning, organisation, and carrying out a sequence of unfamiliar actions". Thus, motor planning has a direct effect on a learner's ability to participate in a music classroom or play an instrument. Hammel and Hourigan (2013:110-111) explain how walking up a flight of stairs requires different steps to participate in the action; first bending the knee, raising the foot and placing it on the next stair before continuing the pattern. The same applies when learning to play an instrument [like the clarinet or piano], as different steps are involved and clear instructions are necessary to teach each step of the task in small units (Hammel & Hourigan, 2013:111).

Music concepts and learning material should be adapted in various ways to teach autistic learners, as not all adaptations will work for all learners and multiple techniques and methods should be used (Hammel, 2004:35). The new material,

[13] Learners with visual orientation may have difficulty with the stark difference of black notes on white paper; placing a transparency over the paper softens the contrast and helps learners to see the words and notes on the page.

equipment or instruments can be taught using hands-on examination while combining a kinaesthetic approach with the use of visual and aural instruction (Hammel, 2004:35). The adaptation of teaching materials will also depend on the learner's strength. Hammel (2004:35) advises using a felt board with five heavy ropes to demonstrate the staff notation. This activity may be appropriate to a kinaesthetic learner, while other learners may avoid the tactile experience. Adhesive-backed Velcro strips can be used in various activities, helping learners to hold small music instruments or to be attached to the back of a ruler to help draw a straight line (Hammel, 2004:35, 36).

Consistency is essential in both the lesson plan and the terminology used in class, as it minimises confusion and anxiety. Terminology should be supported by a word bank, as learners may remember the music concepts, but have difficulty with spelling it (Hammel 2004:36). The primary music words or communication system used in the piano lesson may be in written or pictorial instruction such as *piano/forte*, note values, high/low or yes/no images enhancing responses (Darrow, 2009:25).

3.6 ESTABLISHED MUSIC TEACHING METHODS

There are two primary fields of teaching methods each with sub-fields. There are those that impede reading and emphasise aural development or technique and often start with singing or listening to recordings of pieces (Kodály method, Orff approach and Suzuki approach) (Jacobson, 2006:41; Uszler, Gordon & Mach, 1991:78-81). Then there are the beginning reading approaches in piano pedagogy that emphasise the early development of strong reading skills (Middle-C Reading approach, Multi-Key Reading approach, Intervallic Reading approach and Eclectic approach) (Jacobson, 2006:41; Lyke, 1996:51; Uszler et al., 1991:107).

Jacobson (2006:49) gives criteria that address three questions teachers can use to evaluate the effectiveness of the teaching method books:

- Is the method systematic and logical in its presentation of concepts and skills?
- Does it provide ample reinforcement?
- Does it present a comprehensive introduction to music through piano playing?

These three questions allow a teacher to choose a method that is appropriate for individual learner's needs and level of comprehension. The first methods that will be examined are those that impede reading skills and emphasise aural development.

3.6.1 Kodály method

In the Kodály method, which is based on listening, singing and creating music (Cary, 2012:182), imitation forms the impetus of learning, as teachers use a sound before symbol approach, demonstrating a desired piece or movement (Scott, 2014:2). The Kodály method uses several techniques, including the voice singing the tonic sol-fa; hand gestures that visually represent the tonal degree; and rhythm duration syllables (Cary, 2012:183; Uszler et al., 1991:80). Through this learning process, the learner becomes acquainted with reading, writing and understanding music. Emphasis is placed on the human voice, as it is the most natural music activity (Cary, 2012:182). It might be critical for some learners on the spectrum to use the voice as a musical instrument, since one of the characteristics of autism is impairments in social and communication skills (APA, 2013:50), which can vary from poorly integrated verbal to non-verbal communication. Learners may not be able to imitate a song or sound and thus limit the success of the teaching method. Even if a learner does imitate a song, he/she may have a restricted understanding of social and conversational interpretations (APA, 2013:53).

3.6.2 Orff approach

While the voice is the primary instrument in the Kodály method, the Orff approach uses percussion and recorders as important instruments in the educational process and avoids the use of the piano (Cary, 2012:188; Uszler et al., 1991:78). The basic ideas of the Orff approach are movement and speech/rhythm, with musical creativity and improvisation as the primary goal (Cary, 2012:192). The Orff approach uses everyday elements such as dancing, rhythm, speech and singing to convey and emphasise the feel of rhythm and melody, creating a natural, non-intellectual background, before introducing music symbols. By doing so the teacher lays the foundation of rhythm and melody before teaching musical notation. In the Orff approach classes, learners often follow the leader by imitating a rhythmic pattern on

a percussion instrument, using body movements like dancing or clapping to learn new rhythmic concepts (Scott, 2014:3). The Orff approach may be difficult for children on the spectrum to follow, as the approach primarily relies on the imitation of physical movement and rhythm. Children on the spectrum often experience difficulty with muscle movement and coordination (Hammel & Hourigan, 2013:110) and might find the approach daunting without the necessary visual support.

3.6.3 Suzuki approach

Another approach is the Suzuki approach, which is based on the unique concept of how children learn. The Suzuki approach is designed to teach children instrumental performance with rote-learning at the heart of the method (Uszler et al., 1991:81). Suzuki developed the approach around the mother tongue and suggested that, if a child learns to speak by spontaneous observation, listening skills and imitation, they should be able to learn to play an instrument using the same approach (Lange, 2015:39; Scott, 2014:2; Uszler et al., 1991:82). Though the Suzuki approach may be relevant to some learners, this approach may not be beneficial to autistic learners, as they experience difficulty in learning through observation, rote-learning and imitation (Scott, 2013:2,3). The Suzuki approach is based on a triangle between the teacher, learner and parent. The parent plays a pivotal role, as the learner learns to play the instrument and continues training at home in the daily routine (Uszler et al., 1991:82). In the Suzuki approach all should work together, as both teacher and parent are equally important for the learner to be successful and to develop good music skills (Lange, 2015:38).

For this study, the Kodály method, Orff approach and Suzuki approach will not be used to teach autistic learners to play the piano. The three music approaches are primarily based on aural development, imitation and rote learning, which can be challenging to autistic learners who do not respond to these methods as music teachers might expect (Scott, 2014:2, 3).

The second group of methods that will be examined are those that emphasise reading skills in piano pedagogy.

3.6.4 Middle-C Reading approach

The Middle-C Reading approach commences by introducing middle C as the first note taught to the learner, with both thumbs sharing the key (Jacobson, 2006:41). This approach can be critiqued, as learners initially get used to the middle of the keyboard and not the whole piano, limiting their kinaesthetic feel for the keyboard. Note-reading often depends on individual note recognition and learners tend to read finger numbers rather than playing from their knowledge of pitch names, directional sense, patterns and grouping of notes (Jacobson, 2006:41; Uszler et al., 1991:108). Eye and hand coordination can be difficult, since adding one note at a time delays the recognition of note patterns and groups (Jacobson, 2006:41).

A method book using the Middle-C approach is the *John W. Schaum Piano Course*, first published in 1945 (Baker-Jordan, 2004:191; Schaum, 1995:4-15). The Schaum series briefly introduces learners to finger numbers and keyboard topography, before teaching the first note, middle C. This approach may be difficult for children diagnosed with autism, as a vast amount of information is introduced in a short period of time. This rapid progression allows minimal time for continuous reinforcement and support for the autistic learner. Learners using the Middle-C Reading approach often lack a clear visualisation of the keyboard and a kinaesthetic feel for the relationship of piano keys to notes on the staff, as they are used to play with hands close to the body and to middle C (Jacobson 2006:42; Uszler et al., 1991:108).

3.6.5 Multi-Key Reading approach

In the Multi-Key Reading approach learners are taught rather quickly to play five-finger scales in various keys, using the whole piano while moving flexibly around (Jacobson 2006:42, 43). However, learners often get fixated on this five-finger scale and find it difficult to change the fingering or hand shape later on (Uszler et al., 1991:109). Greer (2003:23) mentions that learners using this approach experience difficulty in recognising notes on the page and cannot place their hands in the correct position without assistance. She argues that the authors of the method books notice the problem writing the hand position on the page allowing learners to place their

hands on the correct notes, but without the necessary understanding of the keyboard topography. Learners read the notes by direction and intervals using fine motor skills. Some books using the Multi-Key Reading approach introduce the rhythm concept quickly. This may result in uneven and imprecise rhythmic playing, as learners may not understand or be ready to play the rhythm (Jacobson, 2006:43). Greater physical demands are expected of the learner to play chords, giving the music a full sound (Jacobson 2006:43; Uszler et al., 1991:109). This Multi-Key Reading approach may be critical for learners with autism, who first need to develop and strengthen motor coordination and gross and fine motor skills before playing individual notes.

The method book, *Bastien Piano Basics, Primer level* (1985:16, 26, 52) is an example of a book using the Multi-Key Reading approach and introduces each key gradually, starting in the C-five-finger position. Although the keys are progressively introduced, the number of music concepts taught and muscle control required may be challenging for an autistic learner. According to Baker-Jordan (2004:172), each five-finger position is practised thoroughly before moving to the next one. New music concepts and skills, without understanding or the ability to play them, may be overwhelming. It is thus essential to introduce new concepts in a simple visual format, allowing the learner to process and understand information learned in the lesson.

3.6.6 Intervallic Reading approach

The Intervallic Reading approach emphasises reading the intervals, which is the distance between notes instead of individual notes (Greer, 2003:23). This approach allows learners to begin reading music notation without a staff (Jacobson, 2006:43), and gradually introduces the staff, starting with two lines and adding one line at a time teaching intervallic patterns (Jacobson, 2006:43; Greer, 2003:23; Uszler et al., 1991:128), and directional notation (Uszler et al., 1991:110). Since the learners do not have to read from the full staff immediately, they have the opportunity to create a strong sense of pulse, rhythm and develop good technique (Jacobson, 2006:43-44). Learners play predominantly on the two and three black keys with fingers two, three

and four, delaying the vital use of the first and fifth finger, which is required to keep a rounded hand shape (Uszler et al., 1991:110).

A method book using the Intervallic Reading approach is *The Music Tree* by Frances Clark, Louise Goss and Sam Holland, first published in 1955 (Jacobson, 2006:43-44; Clark, Goss & Holland, 2000:33). This method book progresses gradually from off-staff reading to "a partial staff with a letter of the musical alphabet being placed on a line or space to name the clef" (Baker-Jordan 2004:175). The partial staff is accompanied by a small keyboard with dots on the white keys showing the hand position. The staff notation is gradually introduced, allowing learners to get a sound understanding of note reading by contour, direction and intervals. The method book gives extensive time practising off-staff reading on the black and white keys, before continuing to explain intervals from two-line through to five-line reading.

Children diagnosed with autism might find this approach too abstract, as they move from playing off-staff on two and three black keys to learning lines and spaces on white keys. Instead of using one of the reading approaches described above, a combination of the three piano approaches may be more effective when teaching children on the spectrum.

3.6.7 Eclectic approach

Pedagogues started to incorporate several reading approaches, which include the Middle-C Reading approach, Multi-Key Reading approach and Intervallic Reading approach, thus creating a 'modified' and 'eclectic' approach (Jacobson 2006:43-44; Sturm, James, Jackson & Burns 2000/2001:25; Uszler et al., 1991:107). Uszler et al. (1991:107) explains that the eclectic approach often starts with pre-staff or partial reading that may prepare for gradual intervallic reading, starting with the middle-C orientation and continuing to the three-C or other multiple guide-notes. The Eclectic approach may be more beneficial to teach autistic children to play the piano, as it allows for a combination of activities to create a method of instruction.

The method book *Piano Adventures* by Nancy and Randall Faber (1993) is one of the teaching series that combines reading elements from these three approaches. This teaching series is also the principal teaching approach for my study. The book

that I will use from this series is *My First Piano Adventure, Lesson Book A*: *Pre-Reader* (Faber & Faber, 2006a), accompanied by *My First Piano Adventure, Writing Book A: Pre-Reader* (Faber & Faber, 2006b). The writing book develops the ear and eye training, introducing theory in a fun and playful manner. Supplementary pieces and activities from *Piano Adventures, Primer Level*, were also used (Faber & Faber, 1993a:6-9, 12-12, 15; Faber & Faber, 1993b:2-3). The *Primer Level* (Faber & Faber, 1993a:6-9) reading begins with off-the-staff black keys exploring four octaves with finger numbers two, three and two, three, four (Baker-Jordan 2004:178). This method is similar to the Intervallic Reading approach, although finger numbers are used instead of quarter or half notes.

The entire *Primer Level* (Faber & Faber, 1993a) is written in a C position and note heads, with letter names, are used until the grand staff is introduced (Baker-Jordan 2004:178). Guide notes (middle-C, treble-G, bass-F) are taught, enabling learners to find other notes on the staff and piano, along with reading notes by steps (2nd intervals) and skips (3rd intervals), without explaining intervals in depth until *Level One* (Faber & Faber, 2011b:26-35). Different finger numbers are often assigned to prevent learners from reading the finger numbers instead of the notes (Baker-Jordan 2004:178). The *Primer Level* first starts teaching the quarter note continuing to the half, dotted half and whole notes (Faber & Faber, 1993a:10, 14, 17, 28). Eight-note values are delayed until *Level Two* (Faber & Faber, 2012:10). According to Baker-Jordan (2004:178), the *Piano Adventures Technique* books teach technique secrets at the beginning of each book, developing muscle strength and coordination (Faber & Faber, 2011c:3). These techniques are then applied within a given music piece. The individual technique books will not be used, as basic techniques are introduced in the lesson book *My First Piano Adventure* (Faber & Faber, 2006a:6-7, 12-13).

3.7 CONCLUSION

The review of the literature has shown gaps in the knowledge of piano pedagogy for autistic children. Little information is available in the literature on how to teach these learners to play the piano, and the majority of data derive from teaching methods used in the inclusive classroom and music classroom. To adapt the piano teaching material and the environment to help future teachers interested in teaching autistic

learners, it is vital to understand the disorder and how the unique cognitive thinking process and the ability of an autistic child will affect the learning environment. These children have different learning abilities, which create a need for suitable teaching methods.

The literature revealed that individuals diagnosed with autism, react positively to music intervention and that positive change has been noticed in both adults and children participating in music activities, including increased attention to task, reduction in anxiety and better coordination. Specific thinking processes have been noticed, as individuals with autism focus on detail and will often be fixated on smaller segments, working from detail to gestalt. It is thus important to understand the cognitive processing theories, such as Weak Central Coherence (WCC) and Hyper-Systemising theory, to cognise how autistic children process learning information and to adapt the material accordingly. An autistic learner may benefit from a structured learning environment, as embedded in the Vygotskian theoretical framework of the ZPD, which guides, instructs and assists an autistic learner in playing the piano while focussing on small segments of detail, gradually building up into a gestalt. Creating an optimal learning environment for the individual learner, according to the cognitive strengths of the learner, may allow for the effective adaptation of piano learning material along with teaching material found being useful in both the inclusive classroom and music classroom.

In the light of the theoretical knowledge, as discussed in the literature, an in-depth explanation will be given in the next chapter how the study was conducted to teach children diagnosed with autism, to play the piano. The adaptation of the Eclectic approach as well as the environment will be discussed according to teaching methods found successful in the classroom for the autistic learner.

CHAPTER 4: METHODOLOGY

The methodology chapter will explain the method that was used to gather in-depth information for the data collection, thus creating a structural framework in which the research was conducted. The primary focus points are to equip the reader with answers to the questions how, what and why of the research by explaining how the research was orchestrated to teach 12 autistic learners and how the data were collected using questionnaires, interviews, journal writings and observation about the lessons. The focus will also be on what method was used to select the participants and why specific adaptations were made in the studio and in the lesson to enable me to teach the learner. The Ethical Considerations and the documentation that were submitted to the Ethics Committee will be discussed, as well as the data analysis, the trustworthiness, validity and reliability of the study.

4.1 RESEARCH METHODOLOGY

In this study, the primary research methodology is qualitative by nature. Creswell (2009:4) explains qualitative research as a means of exploring and understanding a social phenomenon that is ascribed to a social or human problem. Qualitative research allows the researcher to explore and understand the research problems where the variables are not known and literature yields little information about the research question (Creswell, 2014:30).

Qualitative research often uses narrative or descriptive approaches (strategies) to collect data, which could include face-to-face interviews, making observations and recording interaction on videotape to explain the research phenomena (Mills, 2000:5). In contrast with qualitative research, quantitative research can be descriptive or experimental, relying on numerical data to measure two or more variables in the research question (Ivankova, Creswell & Clark, 2007:257; Creswell, 2014:33). A distinct difference between qualitative and quantitative research is the approaches used in the data analysis. The qualitative researcher will reflect on transcriptions from interviews or video material, analysing the words to group it into broader meanings of understanding, whereas the quantitative researcher relies on a statistical, mathematical analysis that is usually in numeric form (Creswell, 2014:33).

In this study I did not make use of a control group versus an experimental group that is often used in an experimental (Creswell, 2014:347) and mixed methods design (Creswell, 2014:584). Although it may seem that part of my methodology is quantitative (for example the data of the bibliographic questionnaire), that data was only used to get a profile of the type of participant and not used in the analysis to get to the findings, themes and subthemes of the thesis.

4.2 PARADIGM

The choice of paradigm is important, as it creates a framework and perspective from which the researcher will collect, view and analyse data. Creswell (2009:5-6) explains that the philosophical ideas and worldview of the researcher will help to explain why a specific research method, such as qualitative research, is chosen. The paradigm creates a foundation for the research method and the research design (Babbie, 2013:57-58; Creswell, 2009:5-6,16). Guba and Lincoln (1994:105) define a paradigm as “the basic belief system or worldview that guides the investigator, not only in choices of method, but in ontological and epistemological fundamental ways”. The paradigm therefore supports the researcher’s view of reality (ontology) and how the researcher thinks that truths and facts, if they do exist, can be discovered and disclosed (epistemology) (Fouché & Schurink, 2011:310; Nieuwenhuis, 2007:55). This creates a platform for addressing fundamental assumptions made by the researcher through observation and enables discussion on these assumptions from the perspective of the paradigm.

The proposed study will follow a constructivist paradigm, which is part of the qualitative research method and worldview (Creswell, 2009:8). According to Fouché and Schurink (2011:310), constructivists believe that there is no truth ‘out there’, only a narrative reality that continuously changes. Reality can, therefore, be socially and personally constructed and the subjects should be actively involved, thus seeing truth as a constructive process (Fouché & Schurink, 2011:310). Creswell (2009:8) states that social constructivists hold to the belief that individuals seek the “understanding of the world in which they live and work. Individuals develop

subjective meanings from experiences that they base on things or objects". Nieuwenhuis (2007:51) adds to this by saying that the constructivist paradigm is predominantly concerned with the uniqueness of each particular situation.

This specific paradigm is relevant to and supportive of the current study, as piano lessons and teaching methods can be constructed to enhance the teaching experience and benefit the learning process, while the learner is actively involved in the piano lessons. The constructivist paradigm allowed me to observe the effectiveness of the adaptation of the teaching methods and the pedagogy styles, thus giving room for change and acknowledging an active process within lesson planning. The constructivist perspective supported my aim to actively be involved in the teaching process while observing the participants' development at the piano.

4.3 RESEARCH DESIGN

Fouché and Schurink (2011:309) are of the opinion that the choice of the research design flows from the chosen paradigm and depends on the way the researcher believes the research question could be answered most truthfully. The research design can be understood as the overall plan of the study, which includes the worldview, strategies and methods used to gain knowledge about the research question (Creswell, 2009:5,16; McNiff & Whitehead, 2010:11; Nieuwenhuis, 2007:70). I applied this knowledge to my study, realising that the research design was not an entity on its own. It was, however, an essential part of building a framework to explore and understand which aspects of the *Piano Adventure* books could be adapted by using the appropriate teaching methods to help the autistic child learn to play the piano.

My study followed a qualitative approach, combining the constructivist worldview (paradigm), an extended literature review, action research strategy and data collection methods (including observations), interviews, questionnaires as well as a personal journal and data analyses. Primary information was gathered by observing the autistic learner's progress in the piano lessons. Secondary information was collected by evaluating the effect these lessons had on the learners' behaviour and

development from the point of view and perspective of the parents and schoolteachers.

4.4 THE SAMPLING METHOD

The sampling method in qualitative research enables the researcher to focus in depth on relatively small sample cases, even single cases to gather information-rich data from participants (Patton, 2002:230). According to Denzin and Lincoln (1998:204), the "sampling choices within and across cases are powerfully determinative of just which data will be considered and used in analysis". The sampling method would therefore depend on whether the study is quantitative or qualitative by nature. In quantitative research participants are systematically identified through, amongst others, random sampling, whereas qualitative research uses a purposeful sampling method to identify participants (Creswell, 2012:205).

Purposeful sampling was used, allowing the researcher to purposefully or intentionally select individuals to participate in the study. Cohen, Manion and Morrison (2000:103) explain that with purposive [14] sampling, the researcher handpicks the participants to be included in the study. It gives researchers the opportunity to purposely seek typical and deviant data (Babbie & Mouton, 2001:166-167) and build up a sample according to the purpose of the study. In this study, it was important to identify children diagnosed with autism spectrum disorder to participate in piano lessons.

There are several types of purposeful sampling, namely extreme or deviant case sampling, intensity sampling, homogenous samples, snowball or chain sampling, criterion sampling and purposeful random sampling (Patton, 2002:230-242). In this study I made used of stratified purposeful sampling to select participants. Stratified purposeful sampling means to select participants according to preselected criteria relevant to the research question (Nieuwenhuis, 2007:79). Patton (2002:240) explains stratified purposeful sampling as "samples within samples" that combine different types of purposeful sampling. Purposeful samples such as homogeneous

[14] Purposive sampling is also known as purposeful sampling (Patton, 2002:230).

sampling, which is based on individuals in a subgroup that has defining characteristics (Creswell 2012:208), and criterion sampling, which is reviewing and studying cases that "meet predetermined criterion of importance" (Patton, 2002:238) can be combined to focus on a specific group of participants. According to Patton (2002:240), stratified purposeful sampling has the "purpose to capture major variations rather than to identify a common core, although the latter may emerge in the analysis".

I decided on a small sample size, as this enabled me to teach piano to a few autistic learners, observing them and evaluating in-depth information gathered from different role players in the children's lives. This is echoed by Patton (2002:230) and Creswell (2014:228) who state that qualitative research typically focused in-depth on relatively small samples, allowing the researcher to learn a great deal more about carefully selected participants.

To recruit the target population in this study, invitation emails (see Addendum A) were sent to various organisations that focus on Autism, namely Action in Autism[15] and Autism South Africa in KwaZulu-Natal, as well as several special-needs schools in the Durban area.[16] I also contacted professionals, including psychologists at Sherwood Children's Centre, paediatricians at St Augustine's and Parklands Hospital, an occupational therapist at Action in Autism, a speech pathologist and speech audiology therapist who focuses on autism. None of the professionals mentioned above were known to me. I explained the study to them and requested them to send information letters to the parents of potential participants (Addendum B). Parents then had the option of contacting me if they were interested in the study. This specific approach was chosen to ensure that the researcher did not have direct contact with potential participants. I found that contacting organisations and professionals working with autistic children was appropriate for this specific sample

[15] Action in Autism is a nonprofit organisation for people with autism and their families (www.actioninautism.org.za).

[16] I gave piano lessons at my studio situated in the greater Durban area. Weekly piano lessons made it necessary for me to give piano lessons in Durban where I lived. The focus of the study was not for the results to be generalised from a sample group to a larger population of children diagnosed with autism. Instead, the purpose was selecting a focus group to illuminate the question under study.

approach, as potential participants were under no pressure to participate in the study.

The participants in this study included the autistic learners, their parents/guardians and teachers working with them at their schools. I received 30 e-mails and phone calls in total and scheduled meetings, identifying potential participants based on their medical diagnoses and interest in piano lessons. The inclusion criteria consisted of the following.

- They were required to provide proof of a prior Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR)[17] based diagnosis of an autism spectrum disorder (ASD) by an appropriate professional (e.g. paediatrician, psychologist, speech-language pathologist and psychiatrist), and had to be between the ages of 6 and 12 years.[18]
- If a potential participant did not show an interest in the piano lesson after the meeting or after the first piano lesson, another potential participant on the list was contacted.

Of the 30 e-mails and phone calls received, four of the participants' parents did not confirm a meeting time; four participants did not meet the age requirement; three participants could not attend piano lessons in the available time slots; one participant was not interested in piano lessons from the start and one participant did not meet the criteria for Autism Spectrum Disorder.

The piano lessons initially commenced with 17 participants, of which one participant had a piano at home and another had access to a piano at the grandmother's house. Parents were not asked whether the child had access to a piano. However, parents who mentioned in the e-mail that the child showed a love for music or had a piano was considered first.[19] During the first four weeks of piano lessons, five of the participants withdrew from the study. Three of them stopped after two weeks, two

[17] Although the new DSM-5 was released in 2013, the diagnoses that the participants received were all based on the previous DSM-IV-TR.
[18] The focus of the study was on young beginners.
[19] Not all the participants had a piano at home.

due to sensory sensitivity (proprioception and auditory) and one because he did not enjoy the lessons and refused to return. In the third and fourth week, another two participants withdrew, one due to a lack of interest and one because the time commitment was too much. I contacted two potential participants on the list and they started with piano lessons in the fourth week. Piano lessons were scheduled on Monday and Friday afternoons for 30 to 40 minutes. The time slot included a 20 to 30-minute piano lesson and additional time for a parent interview was scheduled either before or after the piano lesson. Lessons were conducted with no cost involved at my private piano studio in the Glenwood area in Durban, KwaZulu-Natal. In total, 12 learners participated in the study for the six-month period (see Table 4.1).

Table 4.1: Age, gender, ethnicity, demographic and biographic data

Participants	**Age**	**Gender**	**Ethnicity**	**Medical History**	**Comorbidity**	**Sensory Sensitivity (Parent information)**
Andile[20]	9	Male	African	Autism Spectrum Disorder (ASD), with delayed speech	Inattentive type ADHD Sensory Sensitivity	Hyposensitivity in touch, smell, vestibular, proprioception. Hypersensitivity in vision (light sensitive), aural and taste.
Andrew	8	Male	Caucasian	Autism Spectrum Disorder (High Functioning)	ADHD Sensory Sensitivity	Hypersensitivity to taste. Normal in touch, smell vision.
Daniel	6	Male	Coloured	Autism Spectrum Disorder (ASD) with Delayed speech (non-verbal)	Sensory Sensitivity	Hyposensitivity to sensory sensitivity.
Dinesh	10	Male	South African Asian Indian	Autism Spectrum Disorder, Level 1	With intellectual impairment	Normal
Lusanda	7	Male	African	Autism Spectrum Disorder	ADHD Sensory Sensitivity	Hyposensitive in touch, smell, vision, aural, taste. Normal in vestibular, proprioception.
Neil	9	Male	Caucasian	Pervasive Developmental Disorder-Not Otherwise Specified (PDD-NOS), and Autism Spectrum Disorder (ASD), and Global Developmental	ADHD Sensory Sensitivity	Hyposensitivity in taste. Hypersensitivity in touch, smell, vision, aural, vestibular, proprioception.

[20] Pseudonyms were used for all participants.

Participants	Age	Gender	Ethnicity	Medical History	Comorbidity	Sensory Sensitivity (Parent information)
				Disorder (GDD)		
Nina	10	Female	Caucasian	(Asperger Syndrome High Functioning) Autism Spectrum Disorder (ASD)	ADHD Sensory sensitivity	Hyposensitive to sensory stimuli.
Paula	11	Female	South African Asian Indian	Childhood autism Autism Spectrum Disorder (ASD)	Inattentive type ADHD, With severe intellectual disability Sensory sensitivity	Hyposensitivity in proprioception. Hypersensitivity in smell, vision, aural, taste. Normal in touch, vestibular.
Siyabonga	10	Male	African	Autism Spectrum Disorder (ASD)	ADHD Sensory sensitivity	Hypersensitivity in touch, smell, vision, aural.
Tahir	6	Male	South African Asian Indian	(Classic Autism) Autism Spectrum Disorder (ASD)	Sensory Sensitivity	Hyposensitivity in touch, vision, taste, vestibular, proprioception. Hypersensitivity in smell, aural.
Ulhas	7	Male	South African Asian Indian	Autism Spectrum Disorder (ASD), and Pervasive Developmental Disorder (PDD).	Inattentive type ADHD Sensory Sensitivity	Hyposensitive in touch, smell, vision. Hypersensitive in aural, taste. Normal in vestibular, proprioception.
Zoé	6	Female	Caucasian	Autism Spectrum Disorder (ASD), with delay in speech	ADHD Sensory Sensitivity	Hyposensitivity in aural vestibular proprioception. Hypersensitivity in touch, smell, vision, taste.

4.5 DATA COLLECTION INSTRUMENTS

The data collection instruments used to gather data were supported by the nature of the qualitative research study and action research strategy. Data collection techniques used to gather in-depth information in this study included questionnaires, interviews, observations, journal writings for each participant and video recordings. These are techniques suggested by Mills (2011:73).

4.5.1 Questionnaires

Questionnaires are predominantly used in quantitative (number-based) data collection techniques (Creswell, 2014:28; Mertler, 2012:132) and often consist of close-ended questions. In contrast, questionnaires used to gather qualitative data use open-ended questions and focus on gathering exploratory information (Mills, 2011:73), as well as demographic and biographic detail.

A questionnaire should give the researcher the desired information suitable to answer the questions necessary for usable data (Bell, 1999:118; Maree & Pietersen, 2007:158). It is thus essential to create a well-designed questionnaire that is acceptable to the subjects and will cause no problems during the data analysis and interpretation stages. When planning a questionnaire, both the research questions and objectives should be taken into consideration to ask questions that will acquire the correct answers (Bell, 1999:118). The design of a questionnaire therefore requires the following considerations: appearance, sequence of questions, the wording of questions and response categories (Maree & Pietersen, 2007:158). These points are vital in guiding the participant through a clear and structured questionnaire with questions in proper sequence, while keeping questions on the same topic together and using words in such a way that the meaning of the question will be the same for all participants (Maree & Pietersen, 2007:159-160).

Question types can be categorised into two main categories, namely closed (structured) and open (unstructured) questions (Maree & Pietersen, 2007:160; McNiff & Whitehead, 2010:162). Closed questions have a restricted format ticking a box in which the participant has to choose one or more pre-specified answers, which

can include ‘yes’ and ‘no’ answers, whereas open questions allow the participant to respond with a broader range of ideas (Maree & Pietersen, 2007:161; McNiff & Whitehead, 2010:162; Bell, 2003:120). Creswell (2014:242) explains that a combination of both types of questions is an advantage, as closed-ended responses can give useful information to support theories and concepts in literature. By comparison, open-ended questions permit exploring and understanding the reasons for closed-ended responses. Maree and Pietersen (2007:161) explain that the advantages of open-ended questions allow the participant to give honest and detailed answers, revealing the thinking process and allowing adequate answers to complex problems.

I made use of seven questionnaires in my study namely a biographic questionnaire,[21] parent questionnaire pre data;[22] teacher questionnaire pre data;[23] parent questionnaire three months;[24] teacher questionnaire three months;[25] parent questionnaire six months[26] and teacher questionnaire six months.[27] Questionnaires were not used for the autistic learners themselves, as they are a vulnerable group and might have experienced unnecessary pressure by answering questions they did not understand or were incapable of answering objectively. During the piano lessons, I did question them about piano concepts learned previously to minimise anxiety and stress. The learners were assessed at the end of the six months by asking questions about all the work covered in the piano lessons. The assessment was to give an overview of the reflections and perceptions regarding the lessons and adapted teaching material.

4.5.1.1 Biographic questionnaire

The biographic questionnaire was based on a combination of closed and open-ended questions and was completed by the parents before piano lessons

[21] Addendum J.
[22] Addendum K.
[23] Addendum L.
[24] Addendum M.
[25] Addendum N.
[26] Addendum O.
[27] Addendum P.

commenced. The aim of this questionnaire was to determine whether the child experienced hyper- or hypo-sensitivity in specific areas. The questionnaire provided me with the necessary information to adapt the environment according to the learner's sensory sensitivity.

4.5.1.2 Parent questionnaire pre data

The parent questionnaire pre data was based on the Parental Concerns Questionnaire (PCQ)[28] that was designed by Schroeder, Rojahn, An, Mayo-Ortega, Oyama-Ganiko and LeBlanc (2014:237) as a parent-interview screening instrument for young children with developmental concerns at risk for potentially severe behaviour problems. The PCQ is divided into three individual clusters with 15 dichotomous questions that are labelled as Developmental/Social (8 items), Biomedical (3 items) and Behaviour Problems (3 items) (Schroeder et al., 2014:237), and had high sensitivity identifying children with severe behaviour problems. I contacted Stephen R. Schroeder, one of the compilers of the questionnaire, to obtain permission for the PCQ to be used to evaluate the influence piano lessons may have on the development and behaviour of autistic learners. The original questions of the PCQ were utilised in the parent questionnaire pre data, with minor changes[29] to focus the questions for the specific study.

The parent questionnaire pre data was handed to parents before the piano lessons commenced and included information about the child's developmental and social skills, biomedical information and behavioural problems. The primary aim of the pre-data questionnaire was to identify the child's developmental and social skills, as well as behaviour before piano lessons commenced.

4.5.1.3 Teacher questionnaire pre data

The questionnaire pre data was also handed to class teachers before piano lessons commenced. The goal of the questionnaire was to identify the child's development/social skills and behaviour in the school and class environment before

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[28] Addendum Q.
[29] Permission was granted to make minor changes.

the start of piano lessons. The teacher questionnaire pre data is similar to the parent questionnaire pre data with minor changes. The questionnaire specifically addresses the teacher in the school environment. The three questions about the biomedical information that were present in the parent questionnaire pre data were, however, removed from the teacher questionnaire pre data.

4.5.1.4 Parent questionnaire three months

The parent questionnaire three months[30] was handed to parents 12 weeks after piano lessons had commenced. The focus of the three-month questionnaire was to identify if the participant enjoyed the piano lessons and if any changes had taken place in two of the three clusters, Developmental/Social and Behaviour Problems. Additional close and open-ended questions were added by the researcher, some of which elaborated on questions asked in the pre-data questionnaire, while other questions were based on literature in Chapter 3 to evaluate if there was a change in the child's emotions, for example if the child was calmer after starting with piano lessons.

4.5.1.5 Teacher questionnaire three months

After three months of piano lessons the teacher questionnaire three months was given to the class teacher of each participant. The questionnaire was addressed to the class teacher and evaluated the child's development/social and behavioural skills at school. The teacher questionnaire three months was similar to the parent questionnaire three months, with slight changes, streamlining it for the teacher with the exclusion of the three-biomedical questions.

4.5.1.6 Parent questionnaire six months

The parent questionnaire six months was identical to the parent questionnaire three months. The only difference was that the questionnaire was given to parents 24 weeks after piano lessons had started.

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[30] An additional question was added to the questionnaire to enhance the study.

4.5.1.7 Teacher questionnaire six months

After six months of piano lessons the teacher questionnaire six months was handed out to the class teachers. The questionnaire was identical to the teacher questionnaire three months.

4.5.2 Interviews

Interviews are a form of data collection that allow researchers to obtain the interviewee's thoughts, perceptions and attitudes about the research issues and get valuable information, which would otherwise not be possible (MacDonald & Headlam, 2008:39). Mills (2011:83) adds that follow-up interviews can be conducted with participants who have completed written questionnaires to get clarity regarding specific answers given or for further investigation purposes.

Before embarking on using interviews, it is important to decide who the interviewees will be and what type of interview style (structured, semi-structured or unstructured) and questions (open-ended or closed-ended) are going to be used (MacDonald & Headlam, 2008:40; Nieuwenhuis, 2007:87). In a structured interview, the questions are detailed and developed in advance, whereas an unstructured interview often takes the form of a conversation with the primary intention to explore the interviewee's views, ideas and attitudes (Nieuwenhuis, 2007:87). In my study, I used a semi-structured interview that "requires participants to answer predetermined questions and allows for probing and clarification of answers" (Nieuwenhuis, 2007:87). This specific interview style addresses key themes and permits flexibility to respond to the interviewees and to formulate new questions from given answers and information from other data sources (Nieuwenhuis, 2007:87; MacDonald & Headlam, 2008:40).

According to Creswell (2014:239), qualitative interviews occur when researchers ask participants open-ended questions and record their answers. The types of interviews can be conducted by focus-group interviews, e-mail (Creswell, 2012:218-219), face-to-face, by telephone, Skype or FaceTime (Creswell, 2009:181).

Interviews with the parents took place in the studio on a weekly basis before or after each piano lesson and the interviews with the teachers were conducted in their classrooms after the three-[31] and six-month data-collection period. The semi-structured interviews[32] consisted of five questions to evaluate the autistic learner's response to the piano lesson and to get a perspective on what effect the piano lessons had on the learner's behaviour. The interviews varied in duration from 2 to 20 minutes.

Interviews were found to be useful in this study, as the learners' behaviours and development away from the piano lessons, at home or school, could not be directly observed. It allowed getting in-depth information from parents and teachers, who could provide information on how piano lessons for autistic learners had affected a learner's life. The limitations of an interview are, however, that the researcher's presence may bias responses and that interviewee responses are not as truthful, as information is filtered through their personal view and perception (Creswell, 2009:179).

4.5.3 Research strategies and action research

A variety of research strategies can be implemented in the planning of research design. Some of these strategies include narrative research, phenomenology, ethnography, grounded theory, case study and action research (Creswell, 2009:13; Nieuwenhuis, 2007:71). The strategy of inquiry that I used was action research. Creswell (2014:624) explains the purpose of action research as follows:

> The purpose of action research is to improve the practice of education, with researchers studying their own problems or issues in a school or educational setting. Educators engage in reflection about these problems, collect and analyse data and implement changes or a plan of action based on their findings.

Action research as described by Cohen, Manion and Morrison (2000:226) is a powerful tool for change and improvement at a local level. The solutions found

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[31] Most teachers were not available for the three-month teacher interview due to year-end programs.
[32] Addendum R.

during the action research may have the potential to enhance and positively impact the research group after the research has been completed. Creswell (2014:618) mentions that action researchers do not participate in the action research process to advance their knowledge for knowledge's sake, but rather to enhance education and address specific problem areas in the classroom. Stringer (2007:2,8) describes action research strategy as a systematic approach within a structured framework, namely look (observe), think (reflection), act (action), creating a platform in which the researcher seeks an effective solution to the problem noticed in the lesson.

Several types of action research strategies can be used to conduct the research. Mills (2000:7) describes two main theoretical foundations used in action research, which include critical action research and practical action research. Other types of action research, as explained by Ebersöhn, Eloff and Ferreira (2007:126), Creswell (2014:611), Mills (2011:6,7) and Stringer (2007:20), include technical, emancipatory, critical, participatory and community-based action research. The type of action research will depend on the researchers' perspective and philosophies about the study (Mills, 2000:7).

I used a practical action research strategy. Practical action research created a framework through which I could address the problem and study practical issues while finding new solutions within the literature review and applying it in the lesson. According to Mills (2000:9), the primary focus in practical action research is a 'how-to' approach, which uses less of a 'philosophical' bent. With a practical action research strategy, it is believed that the teacher-researcher, as the decision maker, will choose his/her area of focus, determine the data collection techniques, analyse and interpret the data and create an action plan based on his/her findings and implement it in class (Mills, 2000:6,9). This process is explained in a cycle, as the researcher will continually evaluate the observation and changes made during the action research period, as well as implement an action plan within the next lesson (Mills, 2000:20). Both Mills (2000:20) and Stringer (2007:9) reflect on continuously observing the data collected, evaluating the information and seeking a solution to the problem before engaging in the same process again.

Mertler (2012:104,108) added that when conducting action research, two important points should be taken into consideration. The first point is the principle of benefit; the study should benefit the individuals and never do anyone harm. The second point is the principle of honesty; honesty should always be exhibited in all aspects of action research, both in dealing with the participants and in collecting the data. I considered both these points in my study, as a great amount of time was being spent on teaching autistic learners to play the piano, preparing for the lessons and observing the progress. All piano lessons were recorded[33] on video camera, and interviews on a recording device, thus allowing proximal participation in the piano lessons. Recordings will be kept for five years and destroyed thereafter. The effectiveness of the research study depended on the strategy or approach used within the chosen research design.

4.5.3.1 Practical action research strategy

Action research was found to be applicable for this study, as it allowed me to be actively part of the data collection by giving piano lessons to autistic learners. During these, I identified specific teaching problems that occurred during the lessons and determined how these problems could be solved with the support of teaching materials found to be successful in the literature. It allowed me to then act on the problem by applying the adaptive teaching methods in the piano lesson.

I gathered information while teaching 12 autistic learners to play the piano on Mondays and Fridays over a period of six months. I watched the video material again after the piano lessons, observing the lessons and the actions of each learner. I found it difficult to write down observations and to teach simultaneously, which is why video material was found to be beneficial. Through observations made during class and watching the video material, I interpreted, identified and reflected on problem areas. I adapted existing material or created new material to seek solutions to specific challenges within the lesson. During my observations and reflection on each participant's progress, I noticed that some learners had difficulty in

[33] Parental consent was given on behalf of the child.

understanding piano concepts. Neither the adapted teaching material I used nor the homework given was enough to teach these music concepts. This could have been because reinforcement did not take place on a daily basis and/or because of the fact that most learners did not have a piano at home to practise on.

Literature revealed the benefit of 30-second videoclips in teaching autistic learners new skills.[34] After three months of piano lessons, I noticed that the laminated homework activities and prompts were not sufficient to support the piano concepts learned during the lesson. Intervention took place in which I approached a third person to record me with an iPhone 5 while I played 30-second videoclips. There were 78 videoclips in total, of which 5 clips demonstrated pupil and teacher duets.[35] Videoclips of the units completed up to January 2017, varying between 42-50 videoclips, were sent to parents via WhatsApp. The number of videoclips sent to the parents weekly varied between 3 to 5 depending on the work completed in the piano lesson. Participants were not expected to watch the total number of videoclips, but only those relevant to piano homework being reinforced at home or music concepts found to be difficult. Thereafter clips were sent weekly.

4.5.3.2 Adaptation of methods through intervention

In my study, the activities in the lesson book were adapted according to teaching methods found successful in both the inclusive classroom and music classroom. To teach good posture and technique, real-life, concrete experiences were photographed of the teacher's hands and body posture at the piano and were used in sequence in the lesson, as suggested by Deris and Di Carlo (2013:55). The visual material was used to create an alternative communication system that made it easier for learners to recall meaningful and important music concepts and activities, as was suggested by Darrow (2009:25), thus allowing learners to point to an image instead of giving a verbal answer. Laminated material and Velcro strips were used during the study to help students handle items, as recommended by Hammel (2004:35).

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[34] Cannella-Malone, Sigafoos, O'Reilly, Cruz, Edrisinha and Lancioni (2006:348).

[35] One of my private learners was asked to play the participant duet part while I played the teacher duet. Parental consent was given by both parents and the learner participated in the 30-second videoclips with only his hands being recorded.

Autistic learners often have difficulty in comprehending verbal information and to follow conversations, finding it challenging to remember long sequences of instruction (Garside et al., 2000:10). Simplified language was therefore used in the piano lessons, which were supported by visual music instructions and activities that varied in complexity, from simple and concrete material to more abstract information. Teaching methods were adapted by using gestural, physical and verbal prompts as advised by Garside et al. (2000:10), and challenging music skills, tasks and activities were explained in small steps by using structural modelling, supported by visual cues as recommended by Deris and Di Carlo (2013:53-55). Sensory input was minimised and a quiet place was provided where learners could go when feeling overwhelmed, as suggested by Deris and Di Carlo (2013:53). The piano lessons took place in a structured and predictable environment that enhanced learning, as mentioned by Darrow (2009:25).

4.5.3.3 Inclusion of physical exercises in the piano lessons

After approximately two months of piano lessons it was clear that participants experienced great difficulty in sitting still at the piano. Learners would often get restless, move around and start to lose concentration after a short period of time. As part of my literature review, I came across the positive effect that physical exercises have on autistic children. However, journal articles about hands-on-activities were limited and I approached an occupational therapist, Mrs Elize Janse van Rensburg[36] (January, 2017) at the University of the Free State. She assisted, demonstrated and explained the fine motor skills and physical exercises that were safe and effective to conduct during the piano lessons. In the discussion she gave me two booklets *Fine motor development kit: Designed for children between ages of 5-8 years* (McBean, 2016) and *Tuisprogram vir fyn-motoriese vaardighede* (Van Wyk, 2016), which explain hands-on activities that could be used for children diagnosed with autism. The primary focus of the physical exercises was to create an opportunity for learners to work on both gross and fine motor skills necessary to play piano.

[36] MOT, UFS.

Intervention took place in which I introduced physical exercises that included squeezing a stress ball by using the whole hand or only fingertips. The focus was on building finger and hand strength. Another activity included the use of a washing peg, where learners were asked to squeeze the peg with the thumb and index, middle, ring or little finger. Learners were also asked to make a small ball out of a piece of newspaper by using one hand at a time. Gross-muscle movement exercises took place on a carpet that was covered with a plain fabric piece of material, thus minimising the patterns and texture of the rug. Learners with autism often have visual and tactile sensory sensitivity. Visual sensory sensitivity may cause difficulty in shifting focus and learners can become fixated on detailed patterns and colours, whereas tactile sensory sensitivity may cause learners to pull away from unwanted sensory input and textures (Hammel & Hourigan, 2013:105, 108).

Physical exercises also included a variety of core, back and shoulder exercises. Jansen van Rensburg (2017) explained that strong shoulder muscles and good shoulder stability are necessary to keep the wrist up while playing piano. To promote shoulder stability, learners were asked to baby and crab crawl on the carpet (Jansen van Rensburg, 2017; Kranowitz, 2006:125). Sit-ups were done with cushions behind the learners to support their backs and prevent them from going down all the way. I made the sit-up exercise fun by asking learners to take a ball from a parent or me, standing at their feet, and then asking them to go down and give it back as they came up. In another core exercise, the learners lay on their backs and had to lift their upper bodies to take a ball from a parent or me, standing at the head of the learners. Back and shoulder exercises were conducted by lying on the carpet and slightly lifting the upper body and straight legs up from the carpet, like flying Superman. This exercise was made fun by pushing a stress ball to one another[37] while keeping the upper body and feet in a raised position. The learners could choose when they wanted to do the ‘carpet’ activities.

[37] Participants were asked to lie on the floor and lift their upper body and legs while pushing a soft stress ball to the researcher or parent.

4.5.4 Observations

Creswell (2009:85) explains qualitative observation as field notes taken by the researcher on the behaviour and activities of individuals at the research site. These field notes can be captured in an unstructured or semi-structured way, in which the latter requires some form of questions the researcher wants to know. Observation allows for information to be gathered as it occurs in the class and for studying the behaviour of learners who have difficulty verbalising their ideas (Creswell, 2014:236). Using observation allows the researcher to hear, see and experience reality as the participants do. I found it to be beneficial to the study, as it allowed me to observe the autistic learners' development and behaviour at the piano, their pianistic skills and their understanding of the instrument and musical concepts carefully on a weekly basis. It enabled me to notice problem areas and adapt the teaching material accordingly for the next lesson.

Four types of qualitative observation methods are used in research studies, depending on the research question. These are complete observer, observer as participant, participant as an observer, and complete participant (Creswell, 2009:179; Nieuwenhuis, 2007:85). Nieuwenhuis (2007:85) explains that in 'complete observation', the researcher observes as a non-participant from a distance and does not become part of the research process. The 'observer as participant', which I used in my data collection may, however, partially participate in the research, but still keep his/her position as an observer, remaining uninvolved in the research process. Participating in both roles as participator and observer permits the researcher to be involved in the setting subjectively, while allowing the researcher to see the environment more objectively when not being an active participant (Creswell, 2014:237). Being a participator and observer is often used in action research where the researcher becomes a participant in the situation being observed and may even alter or intervene in the research process.

The role 'observer as participant' allowed me to change the teaching material according to the autistic learners' needs. I observed the learners' reaction to the piano lesson, the adjusted teaching material, as well as the explanation of music concepts. I gathered information directly from the autistic learner during the piano

lesson, as opposed to getting other piano teachers' perspectives, perceptions or feelings about teaching an autistic learner how to play the piano.

I recorded the piano lessons with permission of the parents, which allowed me to observe and gather more information than would normally be the case if research were only observed in class. These video recordings were only used for capturing data and not for use in the public domain. Data were captured immediately after piano lessons, observing how the autistic learners reacted to the piano lesson and lesson material, as well as their ability to play the piano by using basic piano techniques taught in class. I wrote down the autistic learners' understanding towards new piano concepts. The need for newly adapted piano material emerged and was subsequently developed for problem areas, as noticed during the lessons.

I gathered both descriptive and reflective field notes during observation. Descriptive field notes allowed me to describe the events, activities, learners' behaviour and their actions, as they occurred during the piano lesson, whereas in the reflective field notes I captured my thoughts about the lessons. According to Creswell (2014:239), reflective field notes record personal thoughts that relate to the researcher's insight, hunches or broad ideas or themes that emerge during the observation. Both successful and unsuccessful teaching material were observed, along with the piano progress the autistic learners made during the lessons.

4.5.5 Journal

During the research process, researchers often collect qualitative documents, which can be in the form of public records, including newspaper articles, official reports or minutes of meetings. Another form of qualitative documents is private documents, which include journal writing, diaries and letters (Creswell, 2009:181; Creswell, 2014:245). These sources of documents provide "valuable information in helping the researcher understand central phenomena in a qualitative study" (Creswell, 2014:245). Teacher journals can provide a narrative account for their reflection on practice (Mertler, 2012:128), enabling the researcher to gather language and words of the participants and create a systematic representation of data that are thoughtfully compiled (Creswell, 2009:180). I kept a journal of each participant after

completion of the piano lessons and according to my observations, which allowed me to reflect on the work completed during the piano lesson on how each autistic learner personally reacted to the lesson, as well as on challenges noticed during the piano lessons.

4.6 ETHICAL CONSIDERATIONS

To ensure the protection of participants in action research, where both the researcher and the participants are involved in the data collection process, an ethical procedure is necessary to ensure that no harm will be done to the participant, as learners on the spectrum are considered a vulnerable group of children. Research should adhere to ethical standards to protect everybody involved. Participants should never feel obliged to participate in a research study and should be able to pull out from the study at any time when the need arises (Mertler, 2012:103).

Consent forms are important; as they describe what the study is about and inform participants in what area of data collection the researcher requires help (Lichtman, 2013:53; Mertler, 2012:103). In this particular study I prepared six individual consent forms prior to data collection. The consent forms included Parental Consent,[38] Guardian Consent,[39] Teacher Consent,[40] Parental consent on behalf of autistic participant,[41] Guardian consent on behalf of autistic participant,[42] and Institutional Permission Letter.[43]

The school principals gave consent for schoolteachers to participate in the study and for gathered information to be used. A major part of ethical clearance and standard is to ensure that no harm shall be done to any participants and that the researcher follows the best possible research methods to gain data, while protecting the participants' confidentiality and ensuring a safe research environment for the

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[38] Addendum C
[39] Addendum D.
[40] Addendum E
[41] Addendum F
[42] Addendum G.
[43] Addendum H, Consent, was not asked from the South African Education Department as piano lessons and teacher interviews took place after school and not during school hours.

vulnerable participants (Mertler, 2012:104; Lichtman, 2013:52). I provided a cooling-down room, which allowed a learner to calm down when he/she felt overwhelmed. Parents were also present during the piano lessons, thus ensuring that the child could immediate retrieve to them, and learners were informed a month in advance as to when piano lessons would be discontinued.

Information on how the study would be conducted, risk assessment, and documentation (consent forms, questionnaires, interviews, schedules, research proposal as well as a copy of the information letter that was sent to organisations and schools) was submitted to the Ethics Committee, Faculty of the Humanities, University of the Free State. The committee approved the study and an ethical clearance number UFS-HSD2016/339 was allocated.[44]

4.7 DATA ANALYSIS

Data analysis is an essential procedure that takes place during and after data collection. According to Creswell (2014:262) and Nieuwenhuis (2011:99-100), analysing data tends to be an ongoing and iterative process as the data collection, analysis and reporting of the information is interweaved. The researcher often has to go back to the original field notes. In this study, I made use of content analysis that is an inductive and iterative process in which the researcher looks for similarities and differences in the database that would corroborate or disconfirm theory, as described by Nieuwenhuis (2011:101). During the data collection the piano lessons were concurrently analysed as I kept a journal with weekly reflections on the individual learner's development. Parent and teacher interviews were recorded and transcribed verbatim. After the six months data collection procedure, I wrote full transcriptions of each participant's video material, and started coding the data.

Inductive coding was used. This refers to codes that develop while reading through the documents, collecting valuable points and identifies essential data to answer the research question (Creswell, 2014:267; Nieuwenhuis, 2011:109). Nieuwenhuis

[44] Addendum I.

(2011:107) explains that inductive codes develop while the researcher directly examines and explore the data. I read and reread the data to build a deeper understanding of the information and to make discoveries with insight into the information collected. After codes were identified I started to group similar codes together recognising broad categories from the data that gives an in-depth understanding of the individual participants.

Descriptions were written about each learner's progress and the changes noticed by the parents and teachers. Creswell (2014:271) stated that 'describing and developing categories from the data collected allows the researcher to answer the major question and form an in-depth understanding of the central phenomenon through description and thematic development'. The detailed descriptions of each participant were analysed to identify themes and sub-themes to give insight on how piano teaching methods can be adapted. The themes were supported with the literature review to write the findings and to discuss the answer to the research question.

4.8 TRUSTWORTHINESS, VALIDITY AND RELIABILITY OF THE STUDY

In the action research process, it is critical to engage in a systematic and rigorous process to help ensure that the study is relevant and will be done with thoroughness. According to Stringer (2007:57), the rigour in action research is based on strategies to ensure that the outcome of the research is trustworthy and that it is "not based solely on superficial or simplistic analysis of the issues investigated". To establish trustworthiness within a study, Lincoln and Guba (1985:219) mention four points, namely credibility, transferability, dependability and confirmability.

4.8.1 Credibility

Credibility, also referred to as validity strategies by Creswell (2009:191), is the plausibility and integrity of by the study (Stringer, 2007:57). The credibility of the study is enhanced when different sources of information are used to build a coherence of themes (Stringer, 2007:58; Creswell, 2009:191). To establish credibility and validity in a qualitative study, the following strategies can be used: prolonged

engagement, persistent observation, triangulation, peer debriefing, negative case analysis, referential adequacy and member checking (Stringer, 2007:57-59; Lincoln & Guba, 1985:216).

In my study I implemented credibility by exploiting the following aspects: prolonged engagement, persistent observation, triangulation and negative case analysis. A prolonged engagement was applied by giving piano lessons to autistic learners on a weekly basis over a period of six months (26 weeks). Guba (1981:84) explains that the extended period at a site allows locals to adjust to the researcher, not viewing him or her as a threat and to give the researcher time to evaluate their developing thoughts. In my study the prolonged engagement allowed me to check the development of the autistic participant's ability to learn to play piano, as well as evaluate my perception and observation of the study. Persistent observation was recorded in weekly views of the piano lessons, which enhanced the credibility of the research, as piano lessons were consciously observed and notes were taken of what actually happened during the teachings (Stringer, 2007:58).

Triangulation was incorporated by using various data collection methods, including literature, questionnaires, interviews, observations and journal writings (Patton, 2002:556; Guba, 1981:85). In the study I made use of negative cases or discrepant information, which was composed of different perspectives and themes that emerged from the data and did not always agree. Contrary information and themes add to the credibility of the study (Creswell, 2003:196), and create opportunities for the constructive evaluation of data (Patton, 2002:554).

4.8.2 Transferability

Transferability is the posibility that the outcome of an action research study can be relevant and be transferred elsewhere (Stringer, 2007:59). However, unlike quantitative research or experimental studies that allow for information to be generalised to contexts or groups (Stringer, 2007:59) and that are "expected to make relatively precise statements of external validity" (Lincoln & Guba, 1985:316), action research can only apply to a particular group and place. Stringer (2007:59) explains that the transferability of a study lies in the "detailed description of the context(s),

activities, and events that are reported". This is echoed by Lincoln and Guba (1985:316), stating that the naturalist, qualitative researcher, cannot specify the external validity and therefore can only provide thick descriptions necessary to enable someone interested to decide whether transferring the study can be considered as a possibility.

In this study I made use of rich and thick descriptions to communicate the findings and to give the reader more in-depth information of each individual participant. Descriptions included the medical background, development and progress, the specific adaptations used for each participant, the interview, questionnaires, and the journal and observation made during the lessons. According to Creswell (2009:191; 2003:196) detailed descriptions of the data collection "may transfer readers to the setting and give the discussion an element of shared experience". Through an in-depth discussion of the adaptation of the piano lessons it is hoped that the reader will get a sound understanding of the research outcome.

4.8.3 Dependability

Dependability can be explained as the extent to which people can trust that all the systematic procedures have been followed (Stringer, 2007:59), making the study dependable and trustworthy. Guba (1981:86) states that one should make allowances for instability arising from the study either by the revealing of different realities or by the developing insight of the researcher. To establish dependability in a qualitative study Lincoln and Guba (1985:316-318) advise four techniques. The first claims that there can be no validity without reliability and thus no credibility without dependability. However, they argue that this technique is weak and a strong solution should therefore deal with dependability, directly using a more direct technique leading to the second one "overlap methods" representing triangulation; the third technique is stepwise replication and the fourth technique inquiry audit.

In this study I made use of "overlap methods" such as observation, interviews, questionnaires and journal writings. Guba (1981:86) explains that when two or more methods are used the weakness of one method is compensated by the strength of the other method. It may, however, happen that the methods used give the same

results, which means the stability of the data is strengthened. He continues to explain that the “multiple-operations” inquiry supports the credibility and stability of the study.

The last step incorporated to ensure dependability was inquiry audit. Guba (1981:87) explains that an external auditor, or someone competent to evaluate and examine the audit trail, will be approached to comment on the degree to which the procedures used fall into ‘generally accepted practice’. It is echoed by Stringer (2007:59) as well as Lincoln and Guba (1985:318) that an inquiry audit provides a detailed description of the procedures followed, examining the data, findings, interpretations and recommendation judging if the study is dependable and may be accepted. For the purpose of this study all documentation of data was shared, and video recordings were sent to the supervisors via drop-box and were burned onto DVDs.

4.8.4 Confirmability

It is vital that researchers should be able to confirm that the methods used and procedures followed actually took place (Stringer, 2007:59). For the purpose of confirmability in a study an audit trail should be used, enabling an auditor or observer to view the data collected (Stringer, 2007:59). Guba (1981:87) explains that an audit trail makes it possible for an external auditor to evaluate the processes used to collect, analysed and interpret data. Lincoln and Guba (1985:319) echo this, stating that an audit trail supplies a residue of records including documents needed for the inquiry audit to be conducted. In this study I made use of an audit trail that includes documentation such as the actual interviews, questionnaires,[45] journal writings and observation, as well as transcriptions of the piano lessons.

4.9 CONCLUSION

The methodology chapter explained how the researcher went about to create a framework in which in-depth information was gathered by allowing the researcher to be actively part of the study. A purposeful sampling method was used to select

[45] Addendum S.

children diagnosed with autism to participate in the study, while the chosen research design allowed for the adaptation of teaching material. The literature review was taken into consideration while teaching the autistic learner, and the environment was adapted to minimise sensory input. Physical exercises were added and established piano teaching material and language used by the teacher were continuously changed to react to the needs of the autistic learner.

Interviews and questionnaires were used to gain information regarding the participant's reaction and behaviour towards the piano lessons. The interviews and questionnaires also allow the researcher to evaluate if playing the piano, like listening to music as literature revealed, has a positive effect on the learner. In the following chapter the adaptation of the teaching materials will be discussed in depth and will be supported by visual material.

CHAPTER 5: ADAPTATION OF THE LESSON BOOKS

In preparation for the piano lessons, I furnished the entrance hall to my studio in such a way that learners and parents could utilise it as a cooling-down area when learners were over-stimulated. The room only had minimal furniture and I used neutral colours to minimise visual stimuli. However, during the six-month lesson period, learners did not use the room and preferred to be in the studio. The studio was spacious with dark brown wooden floors, curtains and a bookshelf. The furniture was predominantly off-white and the walls a light stone colour.

5.1 THE ADAPTATION OF THE LESSON AND THEORY BOOKS

In this study, I made use of the books *My first piano adventure for the young beginner Lesson Book* A, by Nancy and Randall Faber[46] (Faber & Faber, 2006a) and the theory book, *My first piano adventure for the young beginner Writing Book A*[47] (Faber & Faber, 2006b). The piano adventure books were found relevant for the study as it slowly progresses through music concepts introducing one concept at a time. The gradual and slow process minimised the possibility for learners to feel overwhelmed with too many concepts explained at once. Continuous reinforcement took place both in the lesson and writing book before introducing the next concept. The theory book was used in combination with the lesson book, reinforcing the music concepts taught in a fun and different way. Adaptations were made based on information and knowledge gained from the literature study. Additional activities and adaptations were photocopied in colour, laminated and Velcro[48] was pasted to the back.

The reason for the adaptation was that autistic children are primarily visual learners[49] and language instruction alone does not allow learners to grasp or reinforce

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46 From here on referred to as lesson book.
47 From here on referred to as theory book.
48 I attended a course by Autism South Africa, Hands on Autism (November 2015) that advised us to use Velcro when making activities.
49 Deris and Di Carlo, 2013; Darrow, 2009; Harrower and Dunlap, 2001 Garside et al., 2000

concepts learned in the lesson.[50] Adapting specific activities allowed me to limit additional information on the page and to only focus on essential music concepts. I often used concrete ideas,[51] like plastic animals, to teach dynamic indications and made use of various prompts to explain music concepts to learners. This included physical prompts,[52] for example, placing the learner's hand in a rounded hand shape or playing hand-on-hand pressing each finger down. I used verbal prompts, telling the learners what to do, as well as gestural prompts,[53] often supporting verbal prompts by pointing to a specific image or music direction. The language was simplified,[54] using core words and supported by visual aids.[55] I demonstrated the activities and pieces to the learners by making use of modelling prompts.

Visual prompts were used to connect the concrete piano to the abstract written work on the page. I used Velcro 'ticks' and 'crosses' as well as laminated cards to make it easier for learners to understand the music concept taught. Children often experienced difficulty with communication,[56] as well as fine motor movement, including writing and coordination. Using the cards allowed learners to choose the correct answer, minimising verbal communication and making use of gross muscle movement and tactile, kinaesthetic touch.[57] As suggested by Deris and Di Carlo (2013:55) and TEACCH[58] Staff (2000), I organised the activities from top to bottom and left to right, giving the learners a structured and organised[59] base when completing tasks.

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50 Hammel and Hourigan, 2013; Garside et al., 2000
51 Deris and Di Carlo, 2013; Garside et al., 2000.
52 TEACCH Staff, 2000.
53 TEACCH Staff, 2000.
54 Deris and Di Carlo, 2013; Darrow, 2009; Harrower and Dunlap, 2001; Garside et al., 2000; Walker, 1981.
55 Deris and Di Carlo, 2013; Hammel and Hourigan, 2013; Hourigan and Hourigan, 2009; Willis, 2000; Garside et al., 2000.
56 APA, 2013.
57 Hammel, 2004:35.
58 Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH).
59 Deris and Di Carlo, 2013; TEACCH Staff, 2000.

Autistic learners respond well to structure[60] presented in a visual way and having a piano schedule (See Figure 5.1 as an example).

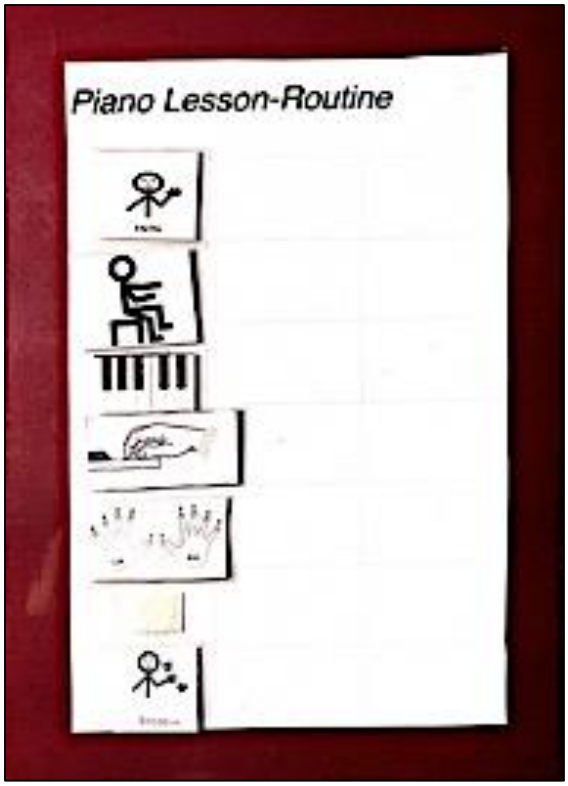

Figure 5.1: Piano lesson routine

I noticed that learners did not pay attention to the schedule after a while, as they became familiar with the structure used during the lessons. I repeated music concepts learned in previous classes, before continuing to new work. Learners often indicated that they would like to proceed by turning the page.

The units completed in the lesson and theory books varied between individual children. Some of them completed only three units, while others completed seven of the possible ten units in the six months (Table 5.1).

[60] Deris and Di Carlo, 2013:53; Willis, 2009:86,88; Harrower and Dunlap, 2001:767; Garside et al., 2000:28.

Table 5.1: Total units completed in the lesson and writing book

Participants	Unit 1	Unit 2	Unit 3	Unit 4	Unit 5	Unit 6	Unit 7
Andile	X	X	X	X	X	X	X
Andrew	X	X	X	X	X	X	
Daniel	X	X	X				
Dinesh	X	X	X	X	X	X	
Lusanda	X	X	X	X	X	X	
Neil	X	X	X	X	X	X	
Nina	X	X	X	X	X	X	X
Paula	X	X	X	X	X	X	
Siyabonga	X	X	X	X	X	X	X
Tahir	X	X	X	X	X	X	X
Ulhas	X	X	X				
Zoé	X	X	X	X	X	X	X

5.1.1 Unit One[61]

The music concepts introduced in Unit One were the sitting position, notes of short and long duration, soft and loud sounds, the typography of the keyboard and a round hand shape. Unit One consists of six work pages namely; *The "I'm great" pose, Sounds on the Piano, Will You Play? Stone on the Mountain, The Name Game* and *Tiger, Tiger*. Makaton sign language was used to support words like 'sit down', 'chair' and 'loud and soft'. The piano lessons commenced using the lesson book, introducing the sitting position in *The "I'm Great" Pose* (Figure 5.2).

[61] Unit One, from the *Lesson Book* as well as the *Theory Book.*

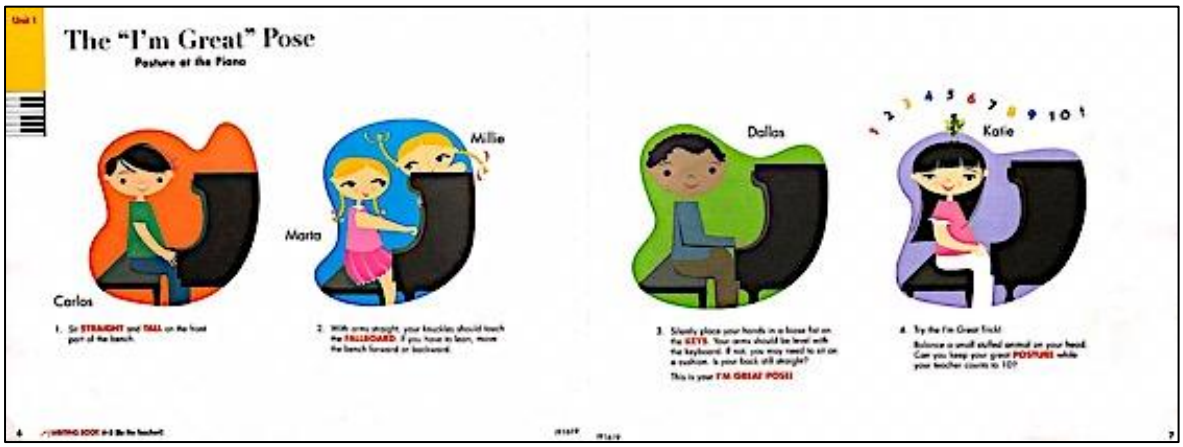

Figure 5.2: The "I'm great" pose (Faber & Faber, 2006a:6-7)

The sitting position was reinforced in the theory book, *Be the Teacher*! (Figure 5.3)

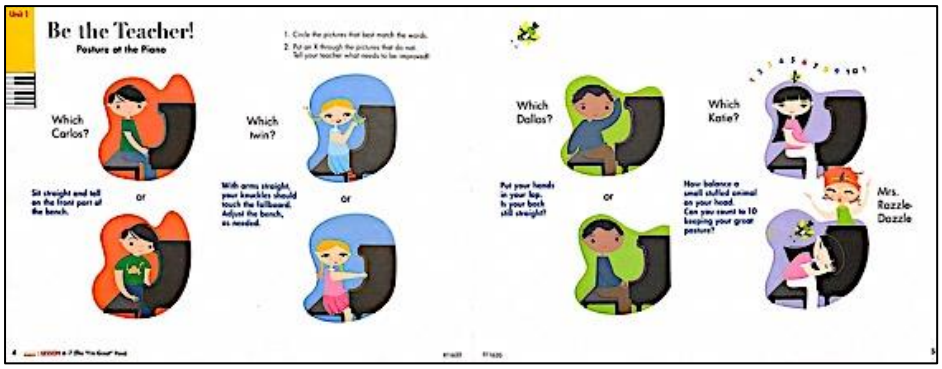

Figure 5.3: Be the teacher! (Faber & Faber, 2006b:4-5)

I adapted the theory activity *Be the Teacher!* and made use of Velcro 'ticks' and 'crosses' to identify which sitting position was correct (Figure 5.4). These aids allowed learners to use gross muscle movement and see the 'tick' and the 'cross' visually.

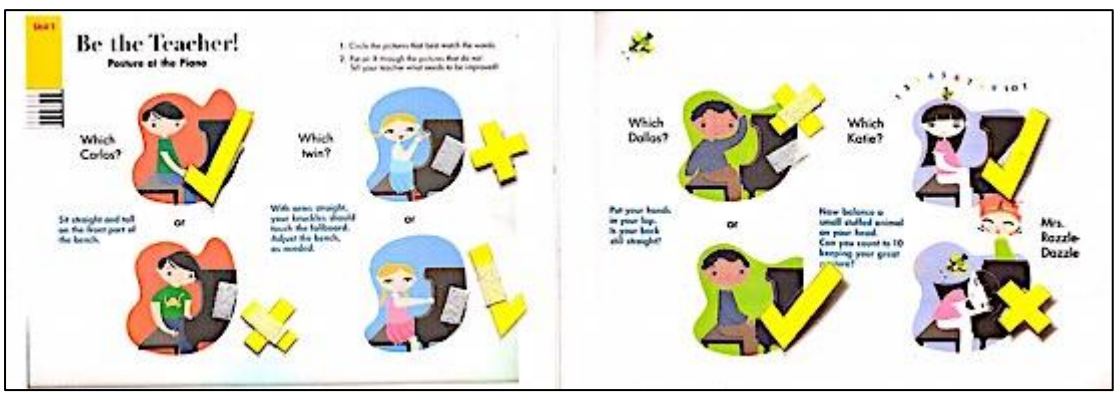

Figure 5.4: Be the teacher! (Faber & Faber, 2006b:4-5)

Learners were then guided to explore the keyboard in the piece, *Sounds on the Piano* (Figure 5.5), and the black and white keys were introduced along with soft and loud as well as notes with short and long duration.

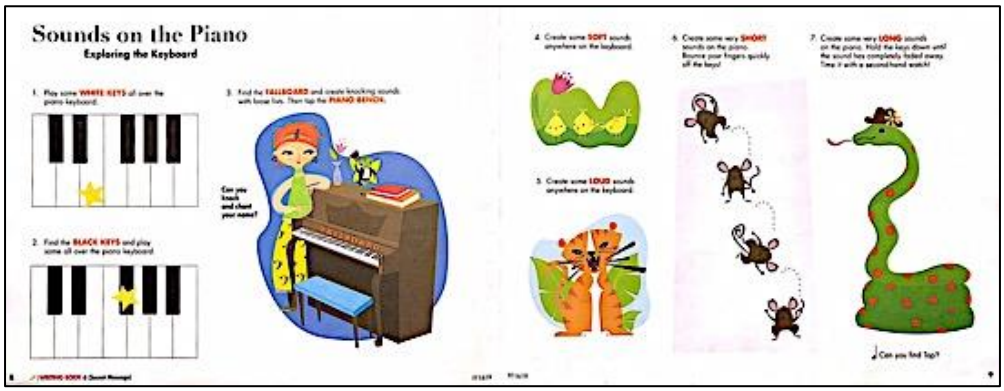

Figure 5.5: Sounds on the piano (Faber & Faber, 2006a:8-9)

Additional material was used to reinforce the black and white keys, as well as the black-key-groups. Children were asked to complete a piano puzzle created by Susan Paradis, *Piano Teaching Resources* (www.susanparadis.com). They had to cut out the individual black and white keys before they could build the keyboard puzzle. The activity was done to reinforce the correlation between the keys (Figure 5.6), and to see that the pattern of two black keys will always be between three white keys and three black keys will be between four white keys. The keyboard puzzle activity was given as homework and explained to parent(s). However, no specific instruction was given on when the activity should be completed, or the duration it should be practised. Parents were asked about the homework the following week; whether the learner experienced difficulties and whether the learner enjoyed doing the activity.

Figure 5.6: The keyboard puzzle (www.susanparadis.com)

Another theory activity, *The Keyboard* (Figure 5.7), was used as extra work to solidify the black-key groups and children were asked to colour in and circle the groups of two and three black keys.

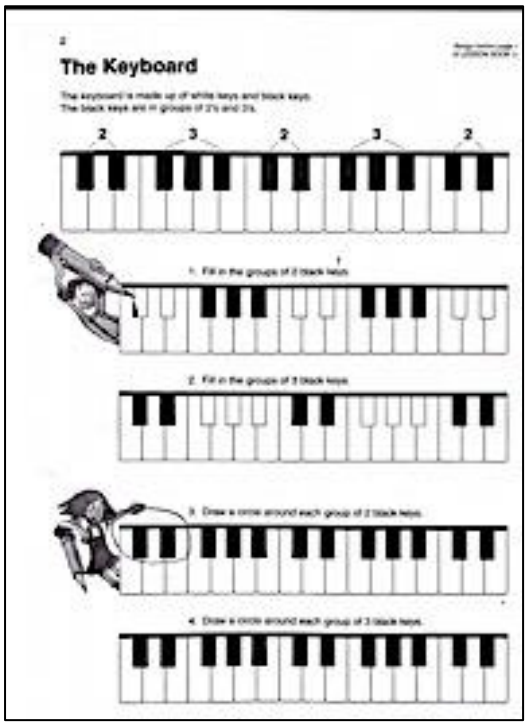

Figure 5.7: The keyboard (Palmer, Manus & Lethco, 1999:2)

To reinforce the loud and soft sounds introduced in *Sounds on the Piano*, I made use of the Makaton South Africa signs in the book *My Big Book of Animals: Core Vocabulary* (Lombard & Fourie, 2014/2015), and created the *Makaton animal activity* (Figure 5.8). Learners were asked to place animal drawings, which were accompanied by the word and Makaton symbol under the correct image (tiger/loud; chick/soft). The activity was not found useful. This might be because of the number of animal images that had to be categorised.

Figure 5.8: Makaton animal activity

The correct hand position was introduced in the piece *Stone on the Mountain* (Figure 5.9). This piece was adapted by removing some images of the hand movement and drawing squares where an image was meant to go (Figure 5.10). The child was asked to place the pictures in the correct order, while chanting the poem teaching the correct hand position. The reason for the activity was to revise the abstract hand movements using concrete visual images and placing it in the correct order.

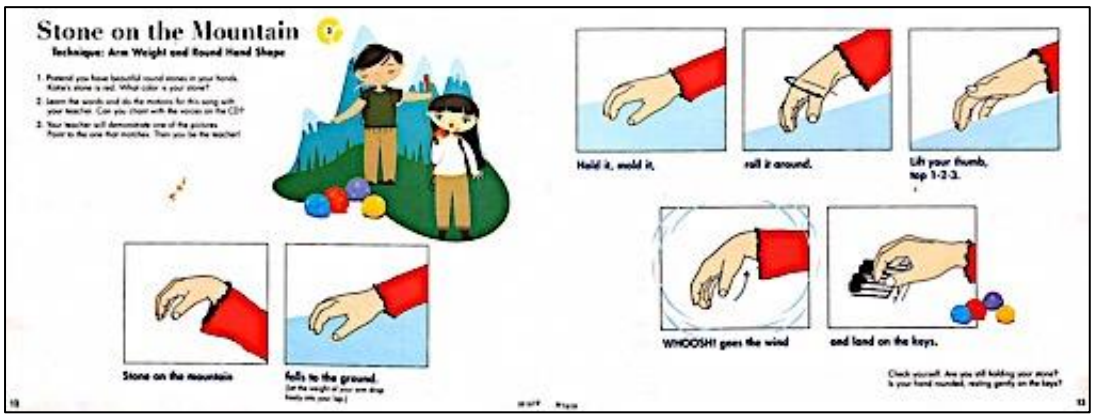

Figure 5.9: Stone on the mountain (Faber & Faber, 2006a:12-13)

Figure 5.10: Stone on the mountain activity (Faber & Faber, 2006a:12-13)

The correct hand position was reinforced by placing two images, the incorrect hand position playing with flat fingers and the correct hand position playing with a rounded hand shape next to each other (Figure 5.11). Learners were asked to indicate the correct position with a tick and a cross at the correct images.

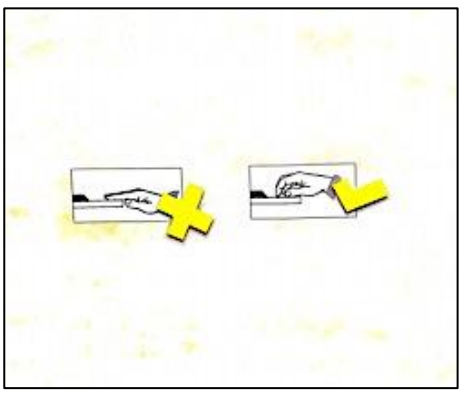

Figure 5.11: Correct hand position (Faber & Faber, 2011a:2)

The activity, *Soft or Loud? Short or Long?* (Figure 5.12), in the *Lesson Book* was adjusted to reinforce both the dynamics and note values.

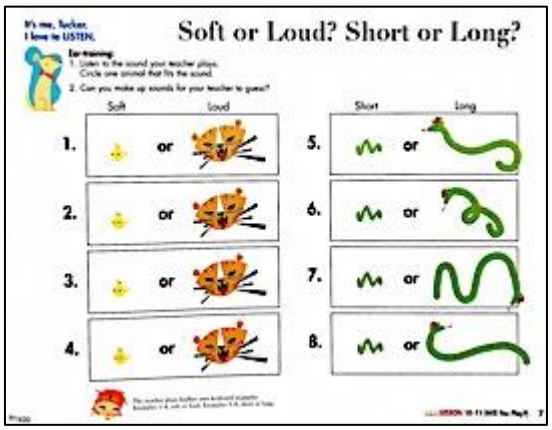

Figure 5.12: Soft or loud? Short or long? (Faber & Faber, 2006b:7)

I asked learners to place the correct music terminology next to the dynamic marks *forte* or *piano* (Figure 5.13). The same was done with the note values (Figure 5.14), and learners had to identify the quarter- or half-note beat they heard me play.

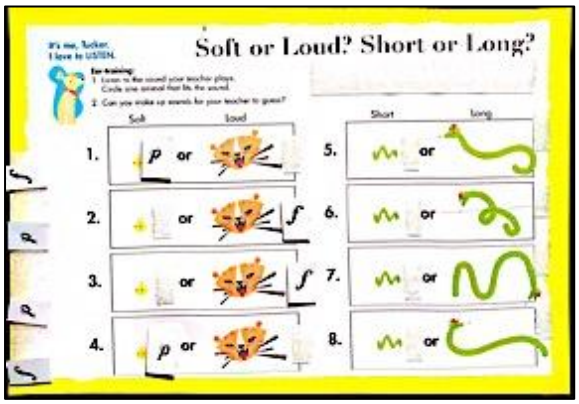

Figure 5.13: Piano or forte? (Faber & Faber, 2006b:7)

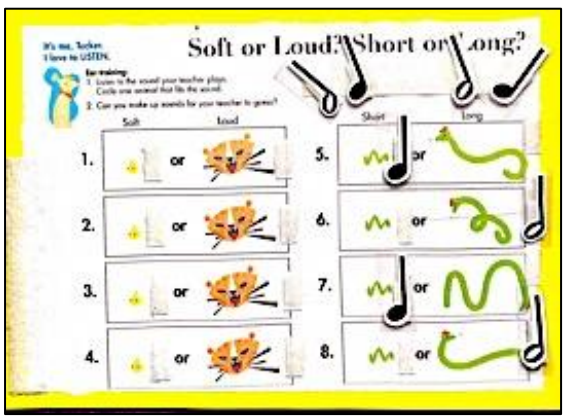

Figure 5.14: Quarter or half note (Faber & Faber, 2006b:7)

5.1.2 Unit Two[62]

The focus in Unit Two was to identify finger numbers, play with firm fingertips, learn low and high sounds on the white keys, and practise playing repeated notes. Unit Two consists of five work pages that include one off-staff piece, *Left Hand and Right Hand*, *Cookie Dough*, *Dallas Dips L.H. Donuts, Dallas Dips R.H. Donuts and Twinkle, Twinkle Little Star* (piece). The *Left Hand and Right Hand* (Figure 5.15) activity introduced the finger numbers in a fun and interesting way. Learners were then asked to tap each finger (number) on its fingertip in the activity *Cookie Dough* (Figure 5.15), practising to play with firm fingertips.

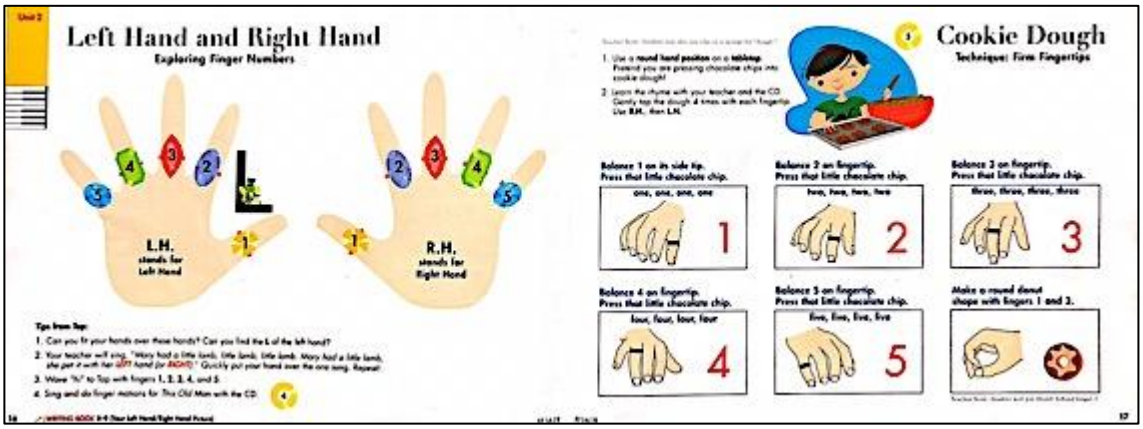

Figure 5.15: Left hand and right hand (Faber & Faber, 2006a:16) and Cookie dough (Faber & Faber, 2006a:17)

Finger numbers (Figure 5.16) were reinforced by an activity I created. This originated from the piece, *Left Hand and Right Hand* (Figure 5.15), where the learners had to place the correct finger number 'ring' on the appropriate finger.

[62] Unit Two, from the *Lesson book* as well as the *Theory book*.

Figure 5.16: Exploring finger number (Faber & Faber, 2006a:16)

I asked learners to create a finger number composition (Figure 5.17), letting them reinforce the finger numbers in a different creative manner. The primary focus was for learners not to place the finger numbers in order 1, 2, 3, 4, 5, but to learn that finger numbers could be played in any order. One of the characteristic traits in autism is restricted, repetitive behaviour, causing them to do or place things in a specific, systematic order (DSM-5 2013:54). It is essential to be able to play finger numbers in any order, as music pieces are composed using a variety of finger number patterns.

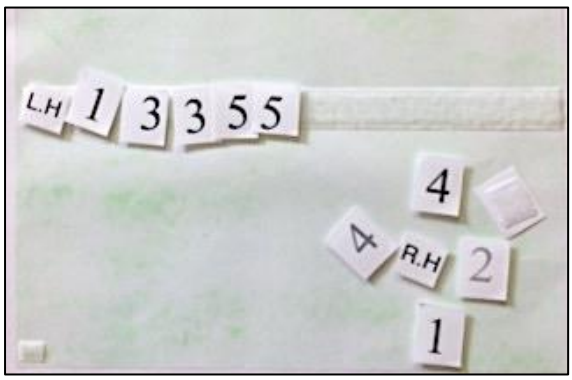

Figure 5.17: My finger number melody

I noticed that some learners experienced difficulty with the above-mentioned activity, connecting a specific finger number to a particular finger. I thus adapted the activity using the same colour cardboard to connect a finger with the correct number (Figure 5.18). Instead of only using numbers to place on the particular finger, the shape of

each finger was cut out, with the specific number on it, making the activity more visual.

Figure 5.18: Colourful fingers (Faber & Faber, 2006a:16)

I then asked the learners to make a melody by using colourful finger numbers (Figure 5.19). The activity was similar to *My finger number melody (*Figure 5.17); however, the difference was the colour-coded fingers and numbers (Figure 5.18). The purpose of the activity was for learners to connect the colour of the finger with the colour of the number.

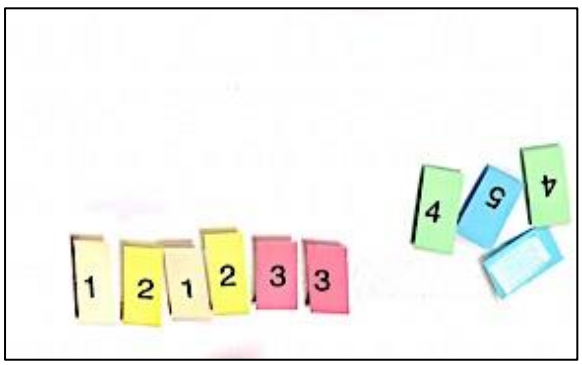

Figure 5.19: Colourful finger compositions

I generated the activity *Which Hand and Finger* from the *Piano Adventure Primer Level* theory book. Learners were asked to identify the correct hand and finger, reinforcing the left and right hand as well as finger numbers (Figure 5.20).

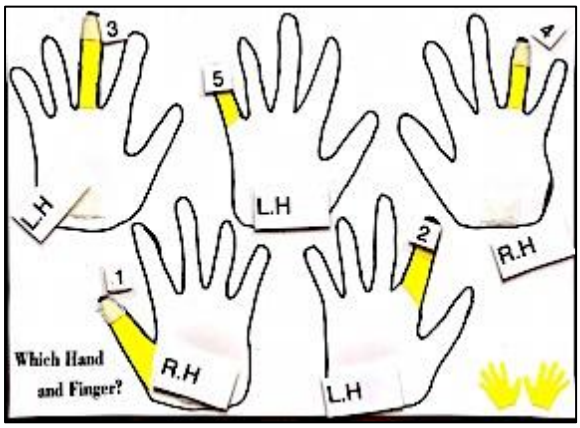

Figure 5.20: Which hand and finger? (Faber & Faber, 2011a:2)

To solidify differentiating between the left and right hand, I attached a medium-sized container to an ice-cream container with two small inserted cups – one for the left hand and the other for the right hand (Figure 5.21). The learners had to move a hand from the container to one of the cups and play a note with the appropriate, indicated hand.

Figure 5.21: Left- and right-hand cups

Low and high sounds on the piano were introduced in the lesson book, *Dallas Dips L.H. Donuts* and *Dallas Dips R.H. Donuts* (Figure 5.22).

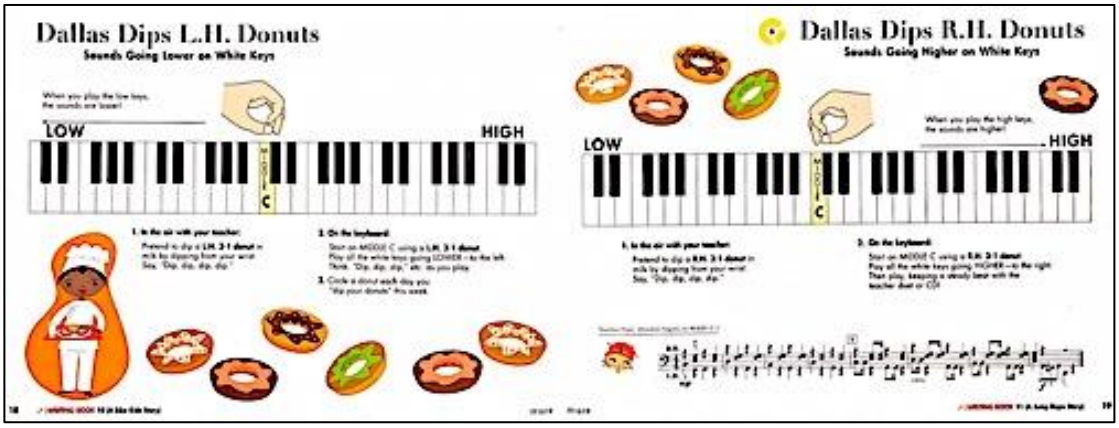

Figure 5.22: Dallas dips L.H. donuts and Dallas dips R.H. donuts (Faber & Faber, 2006a:18-19)

To reinforce the concept of direction on the keyboard, I created the activity, *Dallas Going Up and Down,* using arrows that were placed both vertically and horizontally on the laminated cardboard (Figure 5.23). The vertical arrows were meant to connect the direction to the horizontal movement up and down on the keyboard. The activity might have been too abstract and caused uncertainty. It was not useful, as learners did not understand the movement of the arrows.

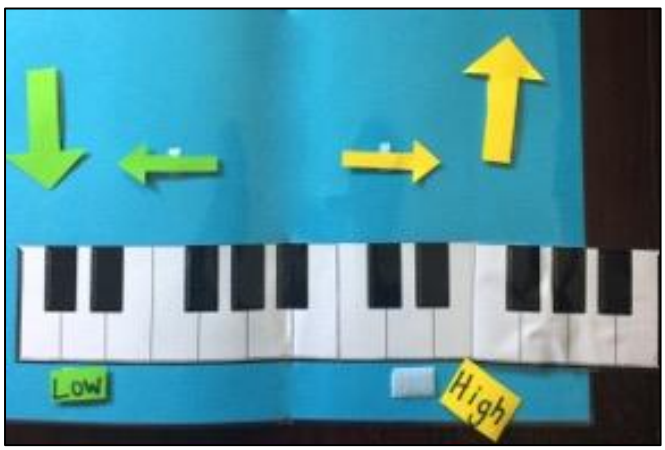

Figure 5.23: Dallas going up and down

During the lessons I noticed that learners experienced difficulty in comprehending direction, as well as high and low sounds. I therefore created additional teaching material to explain direction and pitch more visually and concretely. I took an A3

cardboard, stuck a vertical and a horizontal tree onto it and used bird and frog prompts to connect the visual pitch on the page to the sound on the piano.[63] To make it more visual, I also placed keyboards on the trees. The piano was then compared to a tree; with the high sounds being the leaves where birds live and the low sounds the bark were frogs jump.

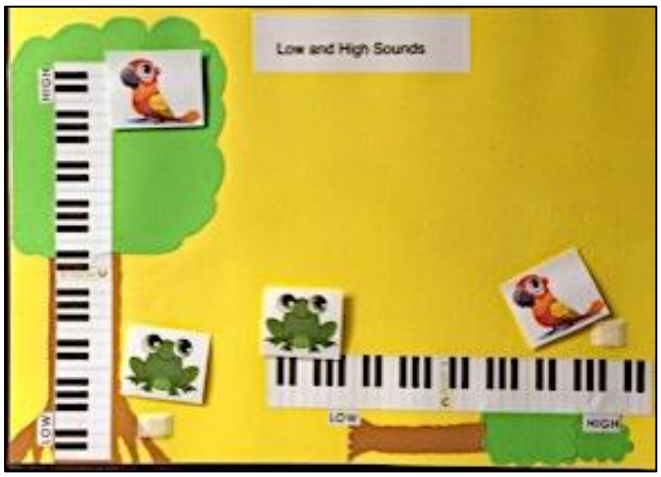

Figure 5.24: Low and high sounds

For the piece *Twinkle, Twinkle Little Star,* small individual stars were made to fit onto the white piano keys. Learners were asked to take these stars and place them onto the correct notes as indicated in the book (Figure 5.25). The piece was given as homework, to practise repeated notes and the up/down wrist movement, as learners had to move their wrist playing on the star[64] notes. The focus was to reinforce the keyboard and the direction up and down in *Twinkle, Twinkle Little Star*. Some learners enjoyed practising the piece at home with their parents, while others did not enjoy homework, as they did not have a piano, or because they associated the piano lesson with the piano teacher and not with the parent in the home environment.

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[63] The activity was based on 'Low and High' in *Piano Adventures, Primer Level*, by Nancy and Randall Faber (1993:3).

[64] The stars were used to indicate what notes the learner should play, as the learner had not learned the keys yet.

Figure 5.25: Twinkle, twinkle little star (Faber & Faber, 2006a:20-21)

Not all learners had a piano at home, so I created a table-top keyboard (Figure 5.26) (www.susanparadis.com). Learners were asked to connect the stars used in *Twinkle, Twinkle Little Star* with the keys on the laminated keyboard and to tap on the correct colour star notes using an up/down wrist movement.

Figure 5.26: Piano keyboard with stars

In the activity, *What is in the Honey Pot?* from the *Theory Book*, learners were asked to place a closed hand on the piano lid and then gently open it. The closed fist helped learners to place a round hand shape on the piano lid while practising finger independence. They were then asked to play the finger number pattern. The activity was not adapted and was given for homework to practise finger independency and to play different finger numbers.

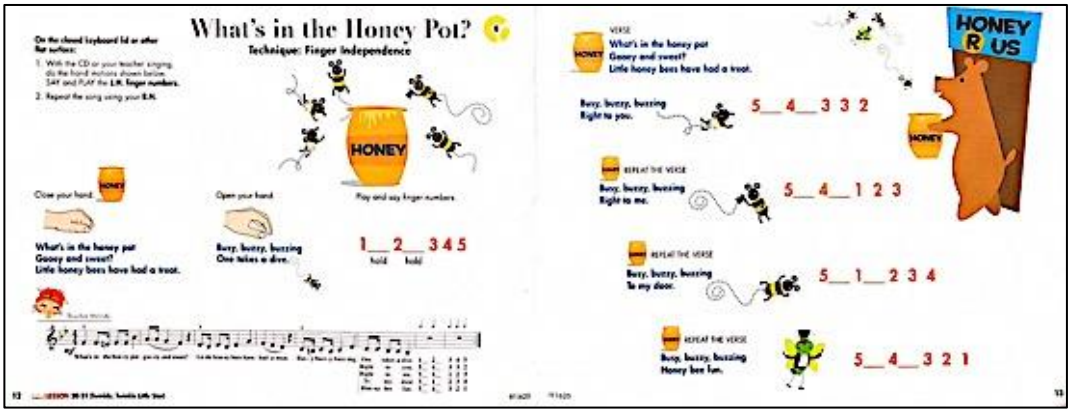

Figure 5.27: What's in the honey pot? (Faber & Faber, 2006b:12-13)

5.1.3 Unit Three[65]

The primary focus in Unit Three were the imitation of rhythm patterns, introducing the arm weight technique that focuses on the wrist, knuckles, fingertips, forearm, shoulder and elbow while playing the piano. The unit continued, introducing the flexible wrist technique, practising graceful wrists movements and playing two-black-key pieces across the keyboard (Faber & Faber, 2006a:22-29). Unit Three consists of eight work pages and includes four pieces, namely *Black-Key Groups; Monster Bus Driver; Wrist, Forearm, Fingertips; Mitsy's Cat Back; L.H. Rainbow* (piece)*; R.H. Rainbow* (piece)*; Kangaroo Show* (piece) and *Katie Score* (piece).

The unit commenced with *Black-Key Groups* and *Monster Bus Driver* familiarising the learner with the keyboard and solidifying learned concepts such as the black and white keys (Figure 5.28).

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[65] Unit Three, from the *Lesson Book* as well as the *Theory Book*.

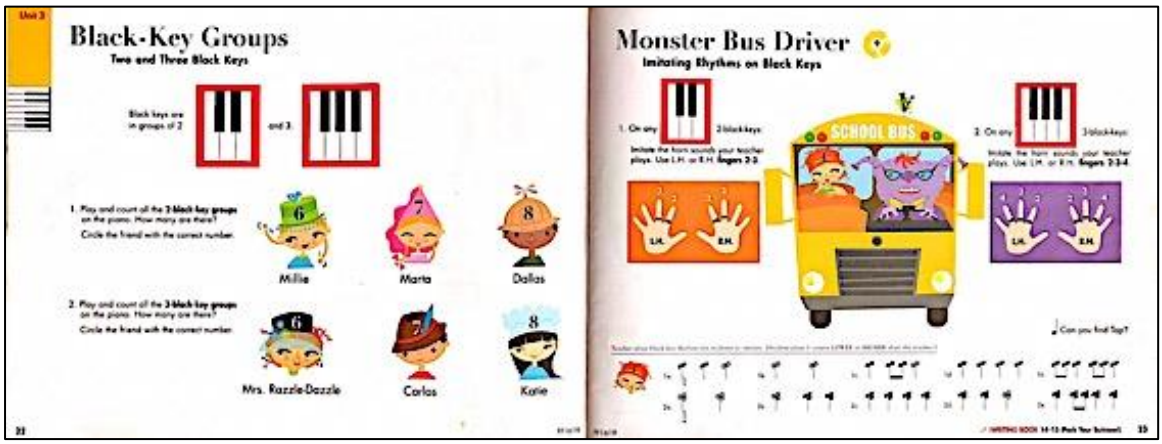

Figure 5.28: Black key groups and monster bus driver (Faber & Faber, 2006a:22-23)

It then continued to the activity *Wrist, Forearm, Fingertips* in which the learner is introduced to their arms (Figure 5.29).

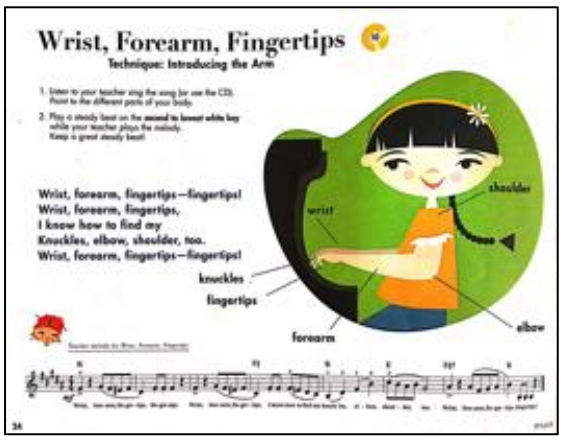

Figure 5.29: Wrist, forearm, fingertips (Faber & Faber, 2006a:24)

This piece did not have writing work, and I created an activity (Figure 5.30) where learners were asked to connect the word with the specific body part, reinforcing the wrist, knuckles, fingertips, forearm, elbow and shoulder.

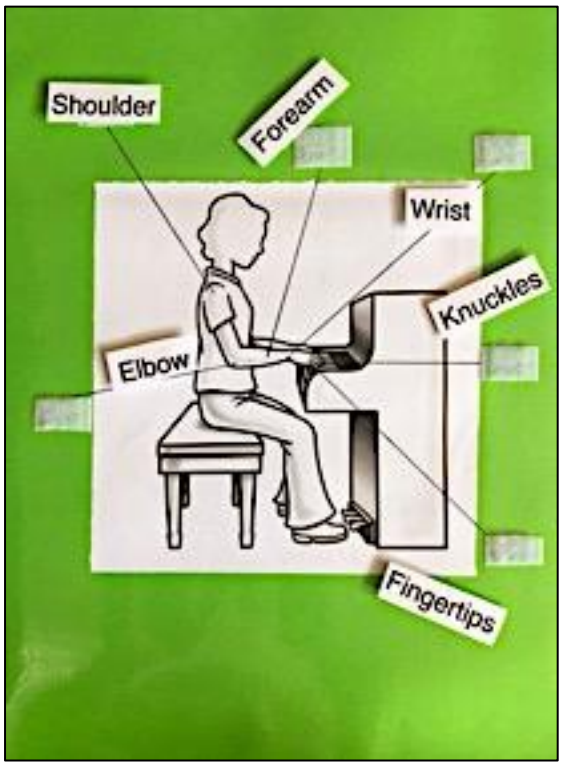

Figure 5.30: Wrist, forearm, fingertips activity

The flexible wrist technique was taught in the piece *Mitsy's Cat Back* (Lesson Book) (Figure 5.31), and reinforced in *Blinker Sees the Cat* (Theory Book) (Figure 5.32). Learners were asked to add ticks and crosses for correct and incorrect answers (Figure 5.33).

Figure 5.31: Mitsy's cat back (Faber & Faber, 2006a:25)

Figure 5.32: Blinker sees the cat (Faber & Faber, 2006b:16)

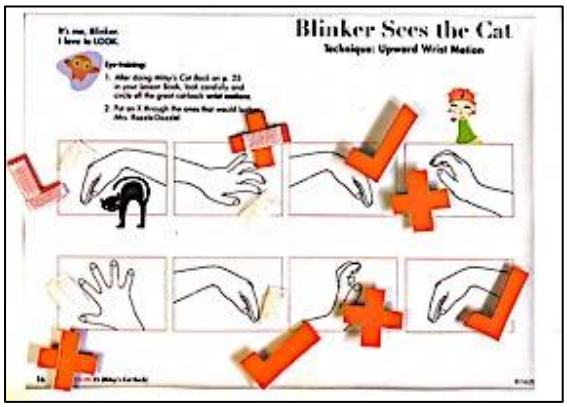

Figure 5.33: Blinker sees the cat activity (Faber & Faber, 2006b:16)

Attention was given to introducing the keyboard, loud and soft sounds on the piano, finger numbers, direction and technique before the learners were asked to play their first basic piano pieces *L.H. Rainbows* (Figure 5.34) and *R.H. Rainbows* (Figure 5.35) applying learned music concepts (Faber & Faber, 2006a:26-27).

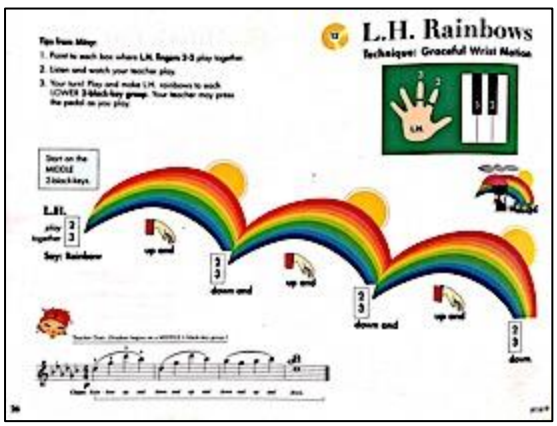

Figure 5.34: L.H. rainbows (Faber & Faber, 2006a:26)

Figure 5.35: R.H. rainbows (Faber & Faber, 2006a:27)

In the piece *L.H. Rainbow,* the learner had to play two black keys simultaneously on the piano, which was indicated by finger numbers 2 and 3. To make the understanding and reading of the notes more visual and concrete, I replaced the finger numbers with images of two black keys going down in *L.H. Rainbows-down* (Figure 5.36) and did the same with *R.H. Rainbows-up* going up (Figure 5.37).

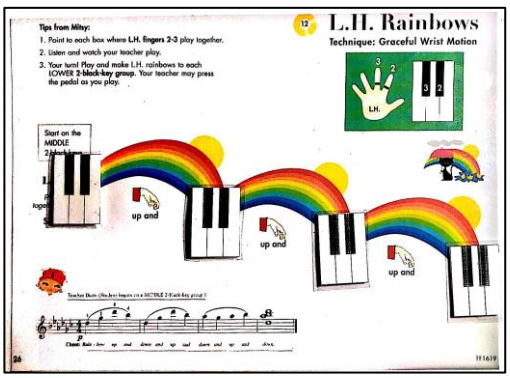

Figure 5.36: L.H. rainbows-down (Faber & Faber, 2006a:26)

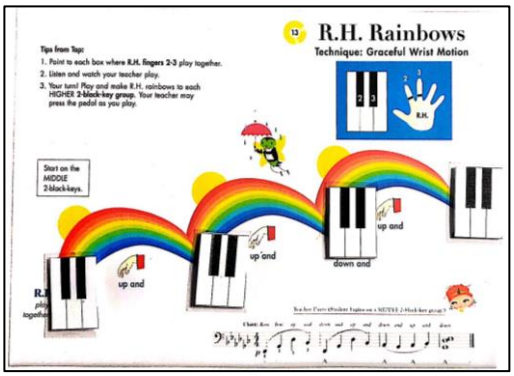

Figure 5.37: R.H. rainbows-up (Faber & Faber, 2006a:27)

Although the visual and concrete black-key groups were found to be effective, as learners could identify it on the piano, the written words underneath the music ‘up and up and up’ seemed to confuse *L.H. Rainbow* as learners did not understand that they should play down the piano, from right to left, while the wording said up referring to the hand movement and not playing up the piano which is left to right. The music pieces, *L.H. Rainbow* (Figure 5.38) and *R.H. Rainbow* (Figure 5.39) were simplified, and I placed the music moving down and up on white cardboard without additional wording.

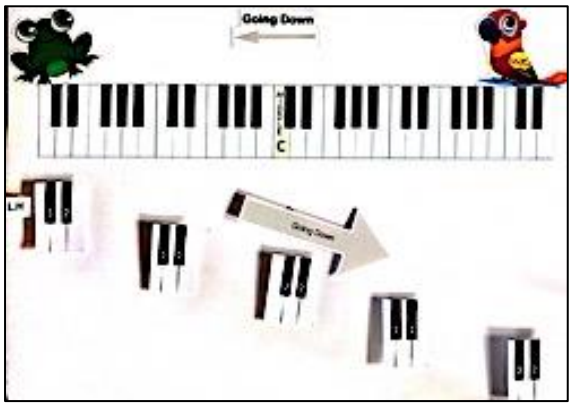

Figure 5.38: L.H. going down (Faber & Faber, 2006a:26)

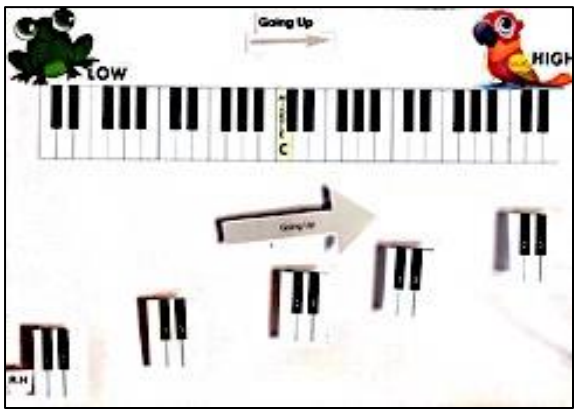

Figure 5.39: R.H. going up (Faber & Faber, 2006a:27)

After the learner seemed to understand the music direction and two-black-key notes, the images were replaced with finger numbers two and three.

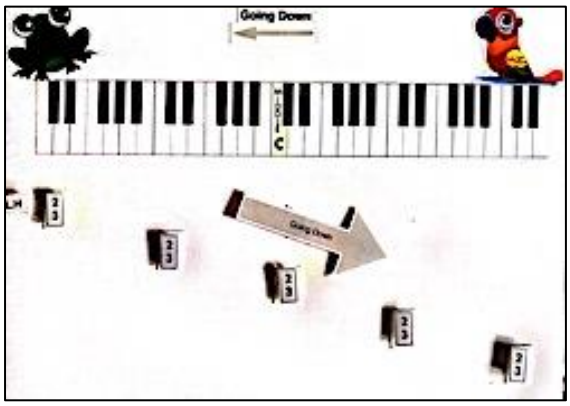

Figure 5.40: L.H. finger numbers – down (Faber & Faber, 2006a:26)

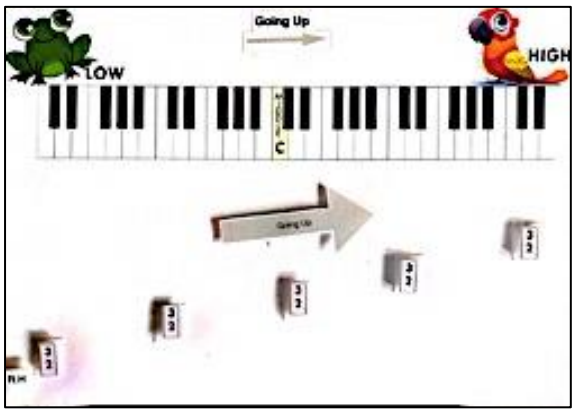

Figure 5.41: R.H. finger numbers – up (Faber & Faber, 2006a:27)

The learners were asked to play *Kangaroo Show* (Figure 5.42) and *Katie Scores!* (Figure 5.42), reinforcing the direction up and down, while playing on groups of two black keys (Faber & Faber, 2006a:28-29).

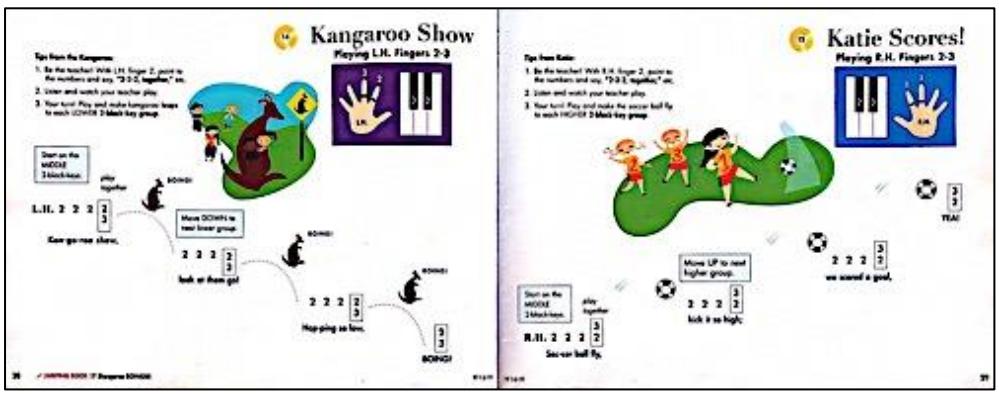

Figure 5.42: Kangaroo show and Katie scores! (Faber & Faber, 2006a:28-29)

The piece *Kangaroo Show* has an ear-training activity in the theory book, namely *Kangaroo BOINGS!* (Faber & Faber, 2006b:17). Learners had to identify and indicate with ticks if the notes that I played were going higher, lower or stayed the same, thus developing ear-training skills (Figure 5.43).

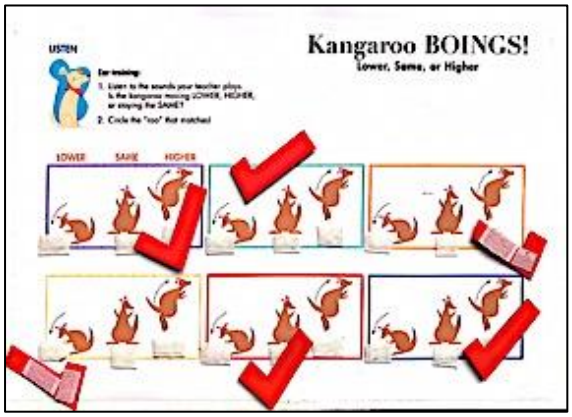

Figure 5.43: Kangaroo boings (Faber & Faber, 2006b:17)

5.1.4 Unit Four[66]

The primary focus in Unit Four was the Italian terminology *forte* (f) and *piano* (p), learning the double bar line as well as playing three-black-key pieces across the keyboard. The Unit consists of one work page, *Tigers at my door,* and two off-staff pieces using finger numbers, namely *Wendy the Whale* and *Magic Tree House.* In the lesson *Tigers at My Door* (Figure 5.44)*,* I used the Makaton signs for big[67] to indicate a big/loud sound and small to show small/soft music.

[66] Unit Four, from the *Lesson Book* as well as the *Theory Book*.

[67] Makaton Core Vocabulary is used for additional words and meaning to get maximum use of the signs the child already knows (Lombard & Alers, 2015:206, 210-211), the sign *big* can be used to refer to *loud* and the symbol *small* to indicate *soft* (Lombard & Alers, 2015:16, 113).

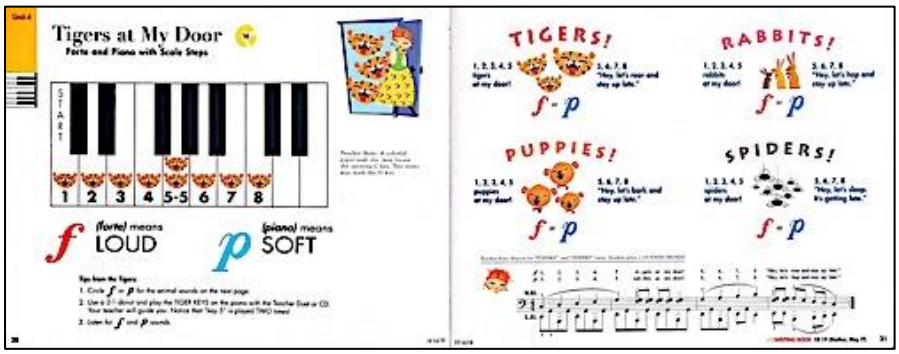

Figure 5.44: Tigers at my door (Faber & Faber, 2006a:30-31)

As seen in Chapter 3, sign language is often used to support auditory instructions. To connect the loud tiger and soft chick sounds learned in Unit One with the new Italian terminology, I used the same images and placed them next to the new Italian music vocabulary (Figure 5.45). Learners then had to connect ***p*** and ***f*** with the correct picture.

Figure 5.45: The piano chick and forte tiger

To solidify *forte* and *piano*, a fun and playful activity was created. I attached a medium-sized container to an ice-cream container with two small inserted cups – one for the animals making *forte* sounds and the other for *piano* sounds (Figure 5.46). The learners had to move an animal from the left container to one of the cups on the right and play *Tigers at my door* with the correct dynamic levels.

Figure 5.46: Animal sounds

The newly learned dynamic marks were reinforced in the two pieces, *Wendy the Whale* (Figure 5.47) and *Magic Tree House* (Figure 5.48), applying music concepts learned up to Unit Four. The Makaton sign for 'finished' was used to explain the double bar line visually.

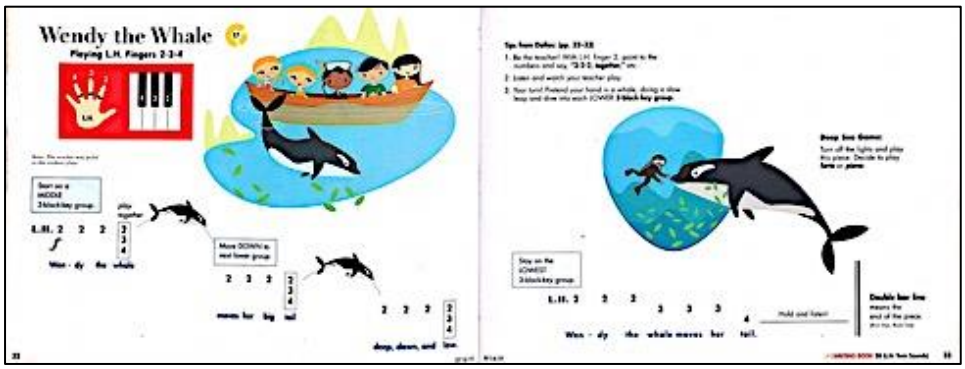

Figure 5.47: Wendy the whale (Faber & Faber, 2006a:32-33)

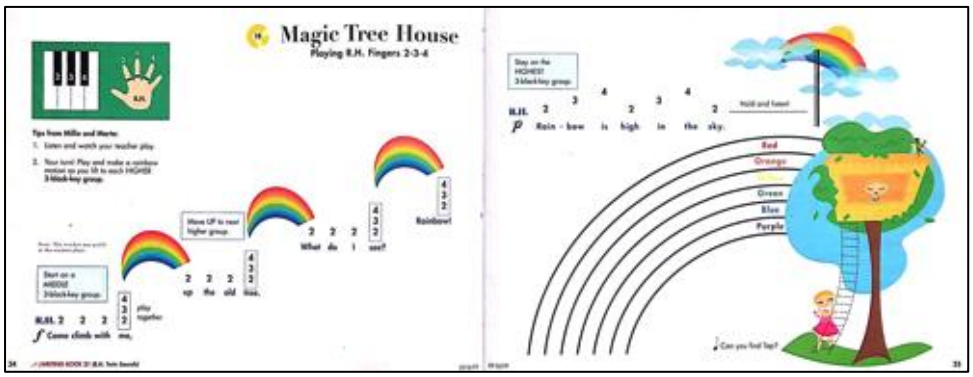

Figure 5.48: Magic tree house (Faber & Faber, 2006a:34-35)

To reinforce finger number patterns and direction, learners were allowed to compose a music piece with the notes used in *Wendy the Whale* and *Magic Tree House.* The finger number patterns in both pieces were cut out to create a music piece either going down in *Creative Wendy the Whale* (Figure 5.49) or up on the piano in *Creative Magic Tree House* (Figure 5.50). The reason for the activity was to learn that notes (finger numbers) could be played in a different order going down or up on the piano.

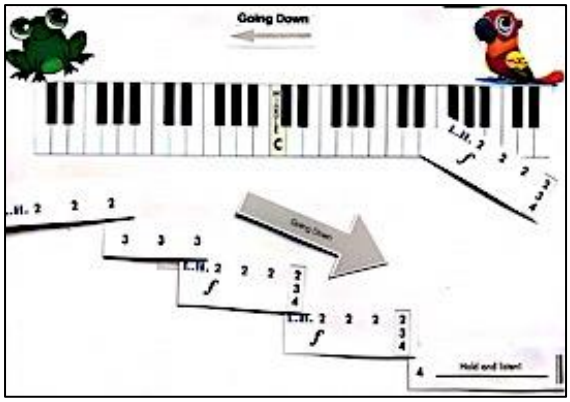

Figure 5.49: Creative wendy the whale (Faber & Faber, 2006a:32)

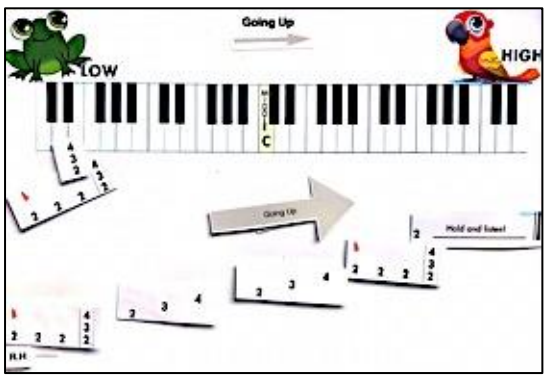

Figure 5.50: Creative magic tree house (Faber & Faber, 2006a:34)

The sight-reading activity *L.H. Twin Sounds* (Figure 5.51) and *R.H Twin Sounds* (Figure 5.52) that was described in the Theory book (Faber & Faber, 2006b:20-21) was adapted and ‘ticks’ and ‘crosses’ were used to indicate matching finger patterns.

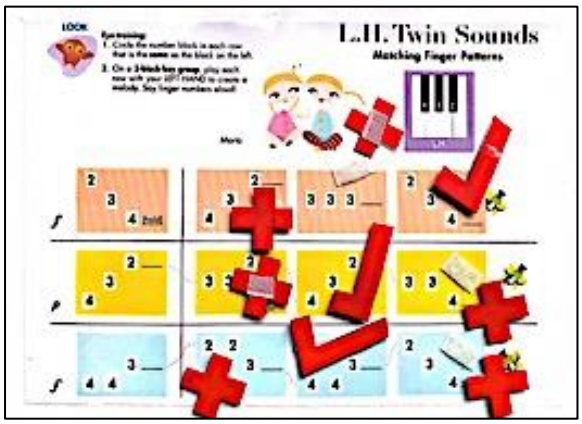

Figure 5.51: L.H. twin sounds (Faber & Faber, 2006b:20)

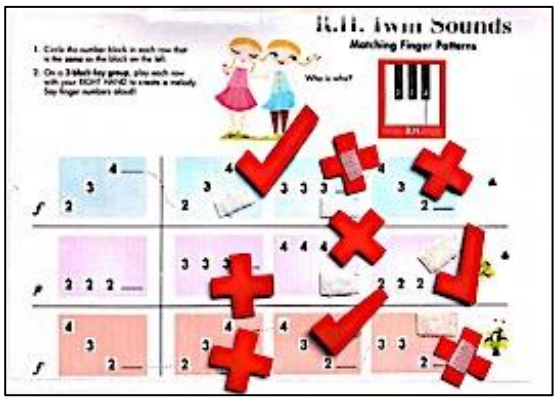

Figure 5.52: R.H. twin sounds (Faber & Faber, 2006b:21)

Learners used ticks and crosses to show which finger pattern in the left column matched those on the right and were asked to play the finger numbers before matching the patterns. During the sight-reading activity they had to identify whether the finger numbers were moving up, down or stayed the same. I noticed that learners experienced difficulty playing with individual fingers and would often press keys down simultaneously. The stress ball was introduced in the lesson, strengthening the hand and finger muscles (see Figure 5.53).

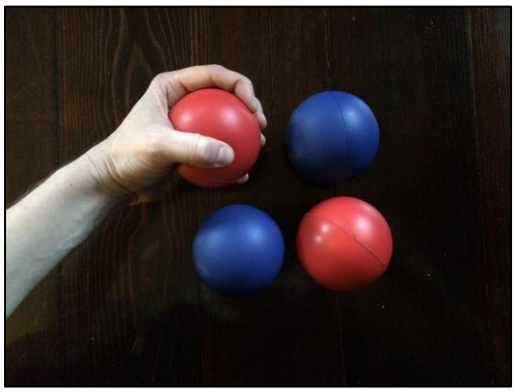

Figure 5.53: Stress ball exercises strengthening the hand

5.1.5 Unit Five[68]

The primary music concepts taught in Unit Five were the quarter note values, repeat sign and learning the white keys C-D-E. The quarter notes were explained as one beat notes and learners were asked to practise drawing right-hand quarter notes with the stem going up and left-hand quarter notes with the stem going down (Faber & Faber, 2006a:36). Unit Five consists of seven work pages that include three off-staff pieces using quarter notes; *Quarter Note = 1 Beat; Dancing Feet; Cuckoo Clock (piece); Dinosaur Music Night (piece); Paw Print; Wabbit the Rabbit; and Little Lost Kitty (piece).* Homework was assigned to reinforce quarter notes, stem direction and note names and learners were asked to complete The Quarter Note writing work (Figure 5.59) and Outer space friends (Figure 5.67). The Unit commenced with the activity *Quarter Note = 1 Beat* (Figure 5.54).

[68] Unit Five, from the *Lesson Book* as well as the *Theory Book*.

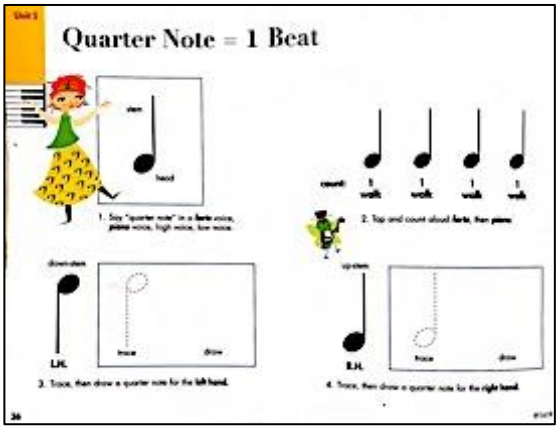

Figure 5.54: Quarter note = 1 beat (Faber & Faber, 2006a:36)

Quarter notes were cut out and used to indicate the right or left hand, depending on the stem direction (Figure 5.55).

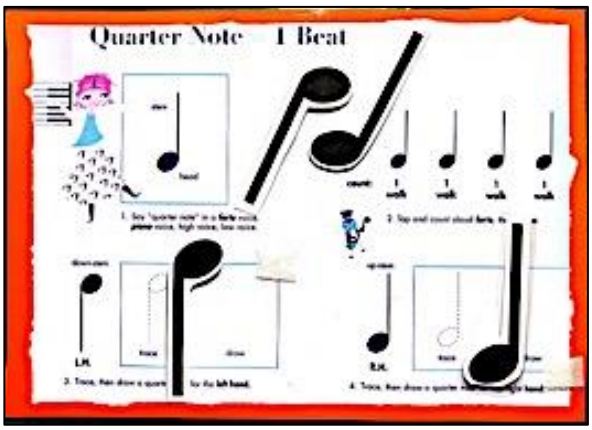

Figure 5.55: The quarter note beat (Faber & Faber, 2006a:36)

I asked learners to place the quarter notes with the stems pointing in the correct direction at the appropriate image. Quarter notes were counted with the metronome "one, one, one". I noticed that learners did not always understand the one count. The quarter notes were then counted as "short-short-short" using a visual/concrete word meaning for an abstract music terminology. The autistic learners had a better understanding of the visual/concrete word 'short' and clapped the quarter notes correctly.

The stem direction learned in *Quarter Note = 1 Beat* was reinforced on the work page *Dancing Feet* (lesson book) (Figure 5.56).

Figure 5.56: Dancing feet (Faber & Faber, 2006a:37)

Learners were asked to indicate the stem direction by placing red ticks next to the quarter note stems going up and blue crosses next to the quarter note stems going down (Figure 5.57).

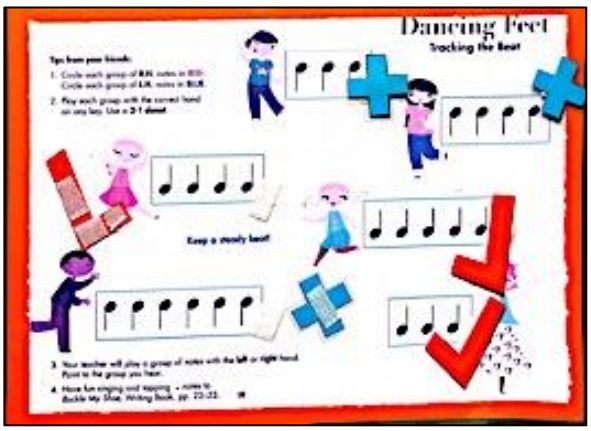

Figure 5.57: Dancing feet activity (Faber & Faber, 2006a:37)

The stem direction and quarter notes taught in *Dancing Feet* were reinforced in the Theory book (Figure 5.58).

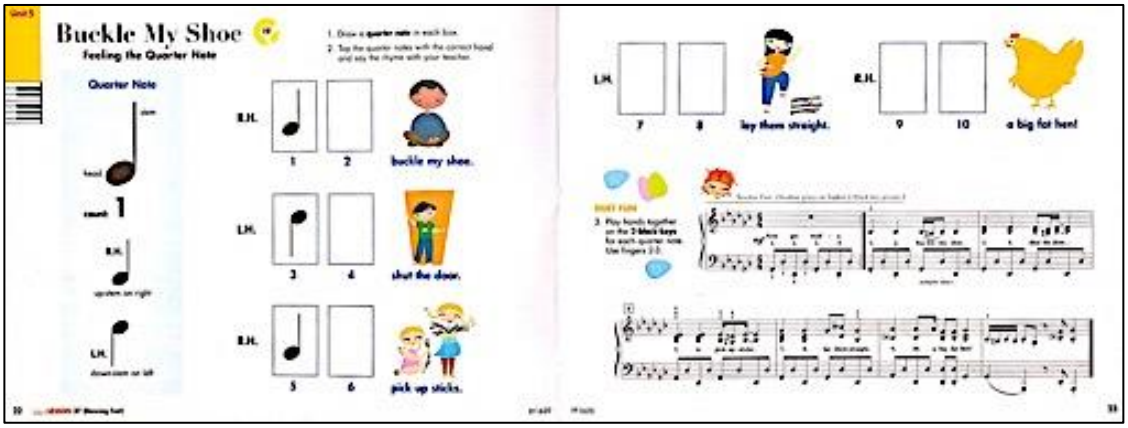

Figure 5.58: Buckle my shoe (Faber & Faber, 2006b:22-23)

The Theory book had additional worksheets, developing sight reading and aural development. I compacted the quarter-note homework in *Buckle my Shoe,* minimising the visual information and images and changing it into the *Quarter Note Writing Work* (Figure 5.59) activity. One-beat note values were placed on one page, and learners had to draw quarter notes with the stems going up and down.

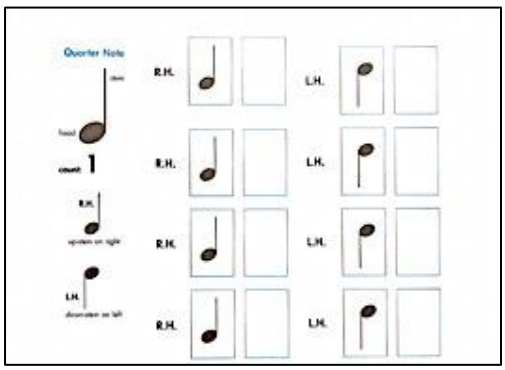

Figure 5.59: Quarter note writing work

I created an activity *Play a Song* (Figure 5.60) to reinforce the quarter notes and stem direction.

Figure 5.60: Play a song activity

Learners were asked to apply their knowledge by composing a quarter note rhythm, using both the right and left hand. I reminded them that the right-hand notes would be at the top and the left-hand notes at the bottom. The bird and frog figures were used to indicate high and low sounds. The *Play a Song* activity was also given as homework.

The quarter note that was taught in previous work pages was practised in the pieces *Cuckoo Clock* (Figure 5.61) *and Dinosaur Music Night* (Figure 5.62).

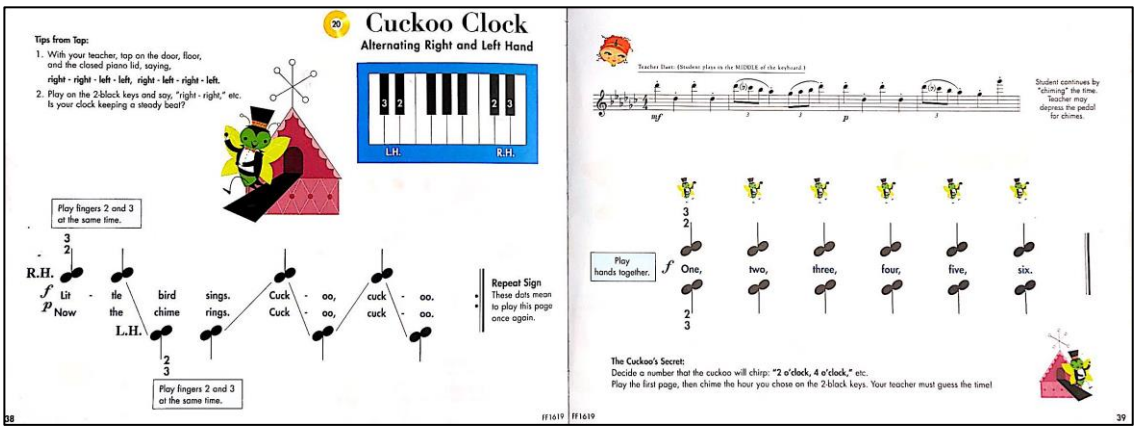

Figure 5.61: Cuckoo clock (Faber & Faber, 2006a:38-39)

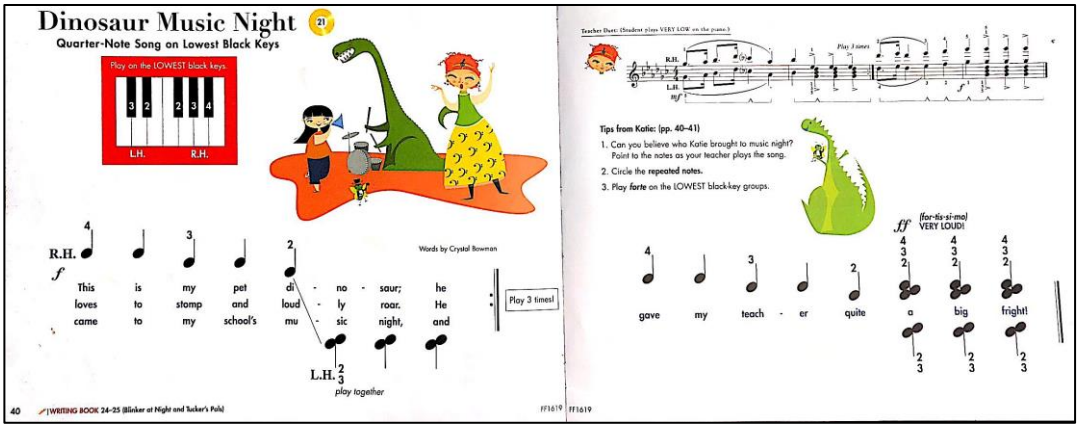

Figure 5.62: Dinosaur music night (Faber & Faber, 2006a:40-41)

The activity in the Theory book (Figure 5.63) practised directional reading in the activity *Blinker at Night* (Faber & Faber, 2006b:24) and arrows were made to place underneath the notes to indicate the direction.

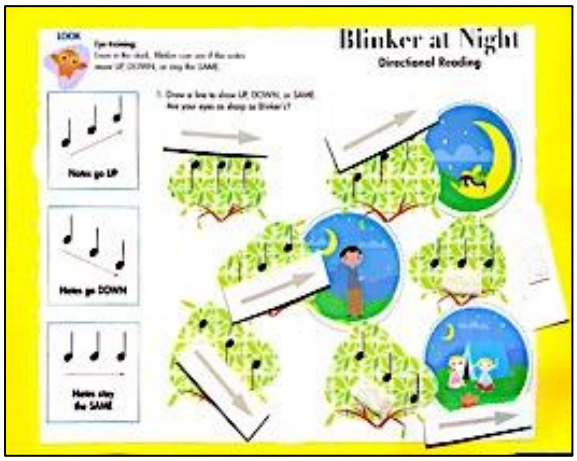

Figure 5.63: Blinker at night (Faber & Faber, 2006b:24)

Ticks and crosses were used in *Tucker's Pals* (Faber & Faber, 2006b:25) (Figure 5.64) and learners had to identify whether the sounds went higher, lower or were repeated. Both activities, *Blinker at Night* and *Tucker's Pals* were given as homework.

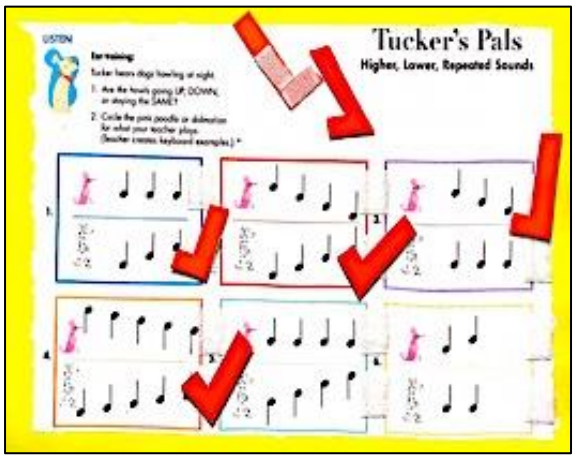

Figure 5.64: Tucker's pals (Faber & Faber, 2006b:25)

The white keys C-D-E were taught in the activities *Paw Prints* and *Wabbit the Rabbit* (Figure 5.65).

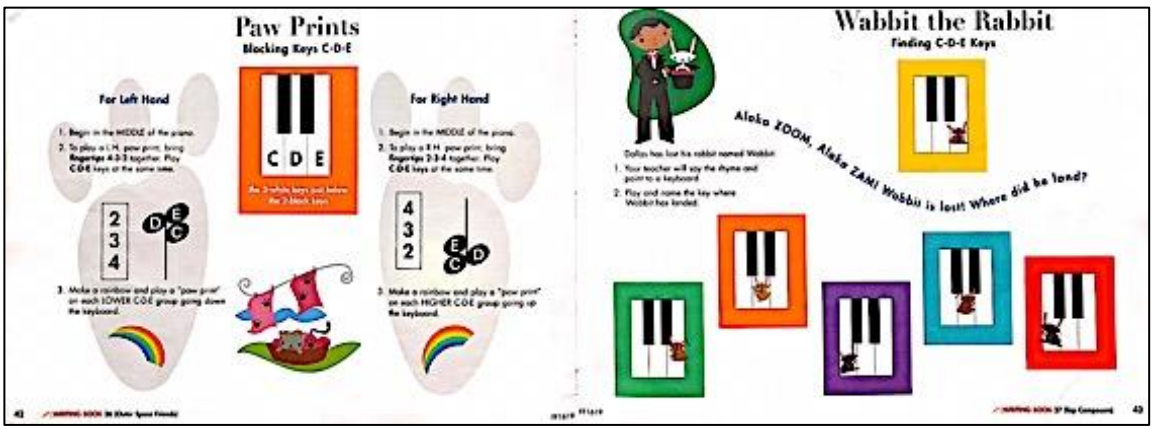

Figure 5.65: Paw prints and Wabbit the rabbit (Faber & Faber, 2006a:42-43)

I used an A3 cardboard for the activity *Wabbit the Rabbit* and made individual C-D-E cards that learners were asked to place on the correct white key at the group of two black keys. The activity was playful, practising seeing the white keys on the page and connecting them to the notes on the piano, as well as identifying the notes on the piano and then connecting them to the page (Figure 5.66).

Figure 5.66: Wabbit, the rabbit, is lost!

To make the activity more visual a plastic orange rabbit toy was used while I said the poem, *Allaka ZOOM, Allaka ZAM! The Wabbit is lost! Where did he land?* The learners then had to identify the correct white key and place a colourful C, D or E on the correct note in *Wabbit, the Rabbit, is lost* (Figure 5.66). The activity was given as homework. To reinforce the letter names C, D and E, the activity in the Theory Book, *Outer Space Friends* (Faber & Faber, 2006b:26) was given to learners in class or as homework. I observed that learners could identify the note names correctly most of the time and they were asked to connect the letter names C-D-E to the correct white key in the spaceship (Figure 5.67). If learners were unsure or did it incorrectly I reinforced the work in class again, solidifying the three white key names C-D-E.

Figure 5.67: Outer space friends (Faber & Faber, 2006b:26)

Learners were asked to play the song *Little Lost Kitty* (Figure 5.68) in which both the note names and quarter notes were reinforced.

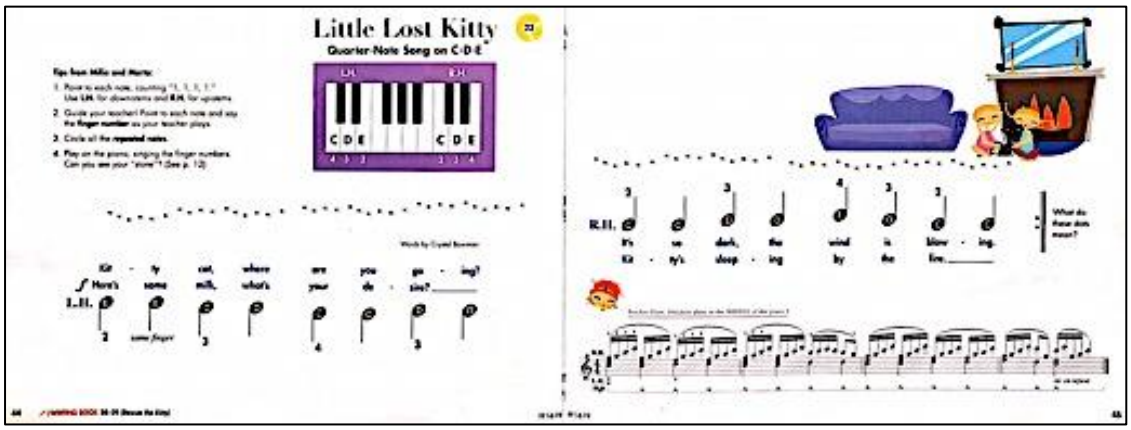

Figure 5.68: Little lost kitty (Faber & Faber, 2006a:44-45)

Continuous reinforcement and support was necessary to solidify previously learned work, with new music concepts taught to learners. The activity *Rescue the Kitty* (Figure 5.69) in the theory book, which was used in collaboration with the piece *Little Lost Kitty*, was a fun composing activity allowing learners to make a melody using finger numbers 2, 3, 4 and playing it on C-D-E.

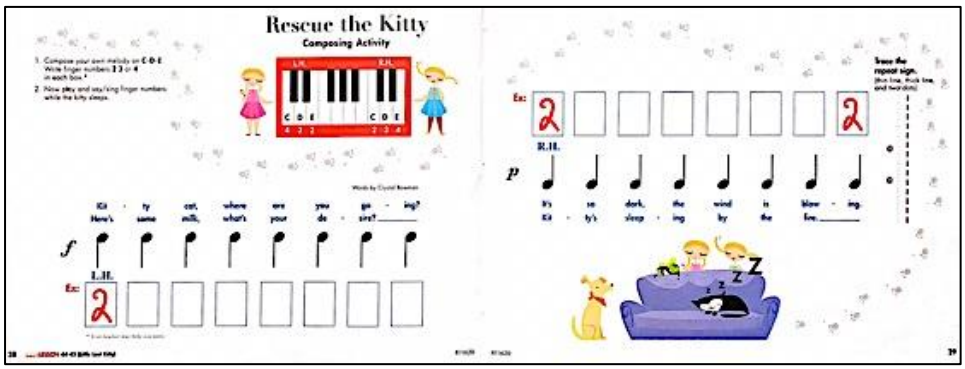

Figure 5.69: Rescue the kitty (Faber & Faber, 2006b:28-29)

I slightly changed the worksheet, by asking learners to stick laminated finger numbers onto the activity board to create their music (Figure 5.70). The activity reinforced both C-D-E and finger numbers.

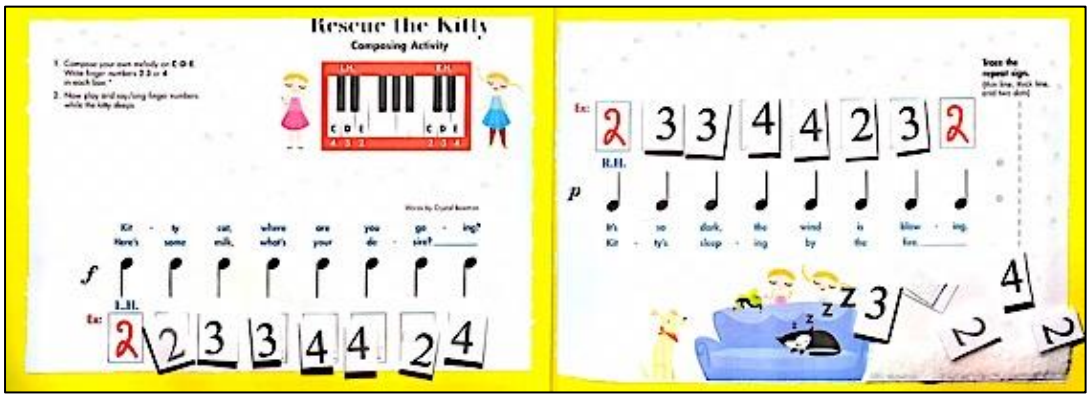

Figure 5.70: Rescue the kitty activity (Faber & Faber, 2006b:28-29)

I noticed that learners experienced difficulty recognising if notes moved up, down or stay the same. Diagrams were used to simplify difficult structures, and I explained that music notes can be the same or different. After learners could confidently identify whether the notes were the same or different, I explained that different notes could go up or down. These diagrams were grounded in Vygotsky's Zone of Proximal Development, working from the learners' understanding of same and different, to new information that different notes could go up or down. The diagrams were found useful as it simplified directional note reading and learners seemed to have a better understanding of the concept. I gave the activities *Does the Music go up or down, or stay the same?* (Figure 5.71), *Music notes can be same or different?* (Figure 5.72) and *Different notes can go up or down?* (Figure 5.73) for homework. Parents were supportive and helped with the reinforcement of piano homework at home.

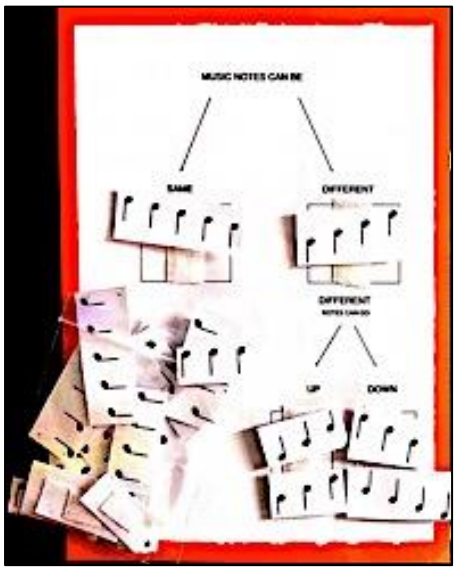

Figure 5.71: Does the music go up or down, or stay the same?

Figure 5.72: Music notes can be the same or different?

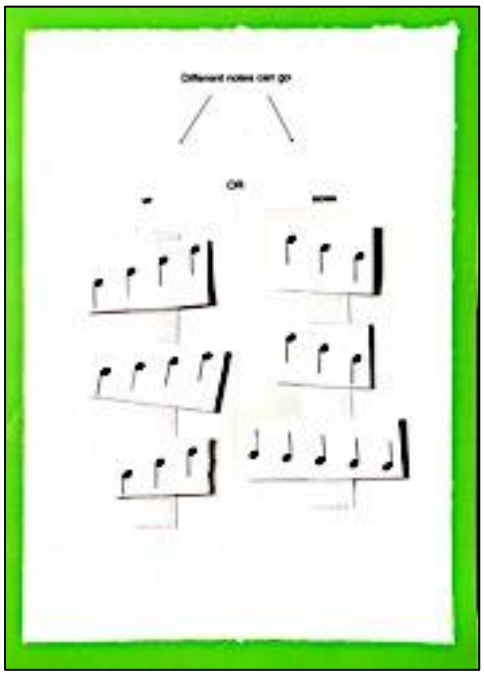

Figure 5.73: Different notes can go up or down?

I noted that learners found it challenging to read and apply more than one music concept in a new piece. They did not know what to do and could not give structured answers. I created questions, supported by images (Figure 5.74), to help learners read a music piece in a structured manner.

- A music box tells us where to place our hands, where is the music box?
- Which hand starts first?
- Which finger starts first?
- Does the music move up, down or stay the same?
- Do you play quarter notes or half notes?

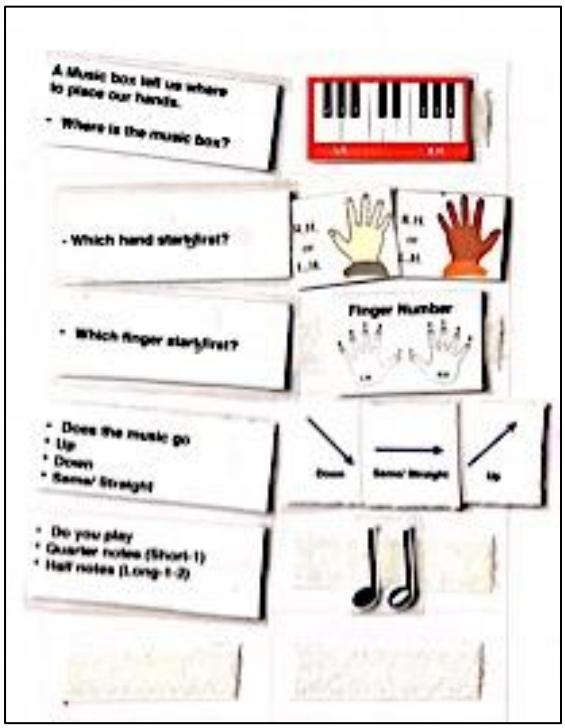

Figure 5.74: Steps to read music

I used additional material to reinforce and indicate the left and right hand on the piano and in the book. I placed two elastic armbands, one on each arm, with the correct colour image and put the same pictures on the piano fallboard and the music page. I found that it helped some learners to recognise the hands, although it took some time before they connected the correct hand with the correct image.

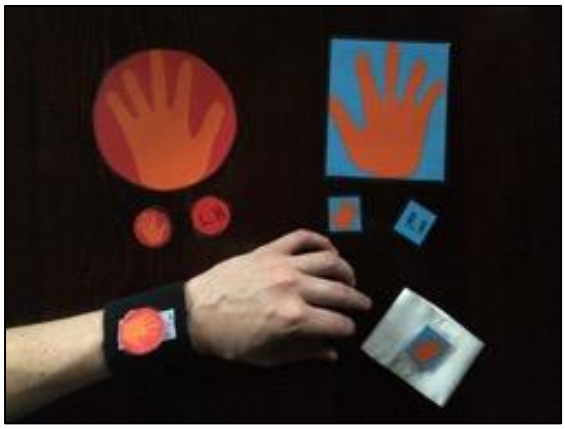

Figure 5.75: Left-hand and right-hand prompts used in class

5.1.6 Unit Six[69]

The primary music concepts introduced in Unit Six, were the half note as well as the Bass and Treble Clef. Stem direction was revised and learners had to identify whether the half note was played with the left or the right hand. Learners were asked to say half note in a loud and soft voice, reinforcing the dynamics *forte* and *piano*. Unit Six consists of four work pages and three off-staff pieces; *Half Note = 2 Beats; Band Practice; Monsieur Mouse* (piece); *Raccoon's Lullaby* (piece); *Bass Clef; Treble Clef; Mary's Rockin' Pets* (piece).

The Unit commenced with *Half Note = 2 Beats* (Figure 5.76) and continued to the activity *Band Practice!* (Figure 5.77) in which *s*tem direction and rhythm patterns, including both quarter and half notes, were practised (Faber & Faber, 2006a:46-47).

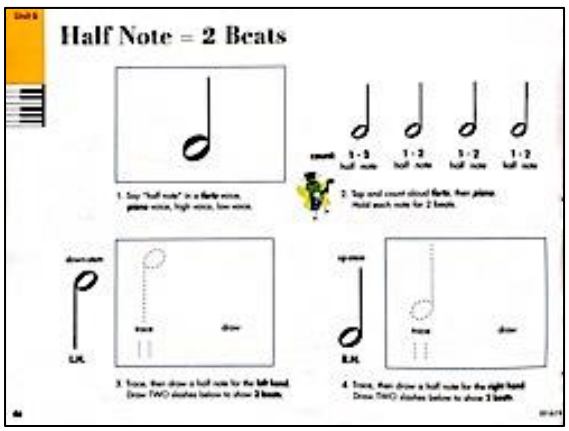

Figure 5.76: Half note = 2 beats (Faber & Faber, 2006a:46)

[69] Unit Six, from the *Lesson Book* as well as the *Theory Book*.

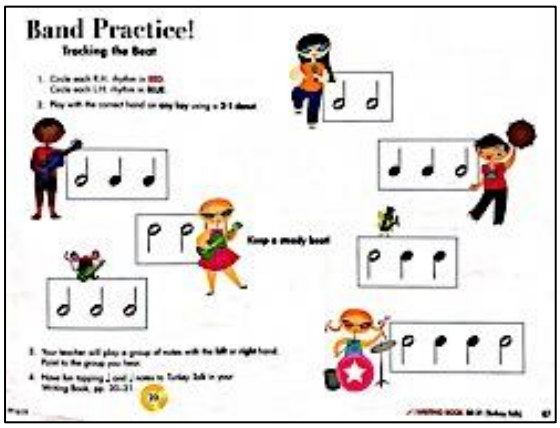

Figure 5.77: Band practice! (Faber & Faber, 2006a:47)

Half notes were cut out and used to indicate right or left hand, depending on the stem direction in the activity *Half Note = 2 Beats* (Figure 5.78).

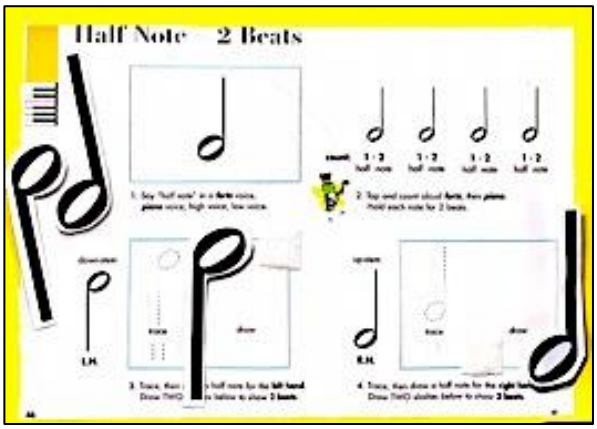

Figure 5.78: Half note = 2 beats activity (Faber & Faber, 2006a:46)

Learners were asked to play/clap the note values. The half note values were counted one-two, one-two, but learners did not understand that the note should be held for two beats. I continued counting them as one-hold, one-hold but noticed that they still did not comprehend. The half notes were then counted Lo-ong; Lo-ong using a more visual and concrete word meaning, which gave them a better understanding. The stem direction was reinforced in the activity *Band Practice!* (Faber & Faber,

2006a:47) and learners were asked to place red ticks next to the half note stems going up and blue crosses[70] next to the half-note stems going down (Figure 5.79).

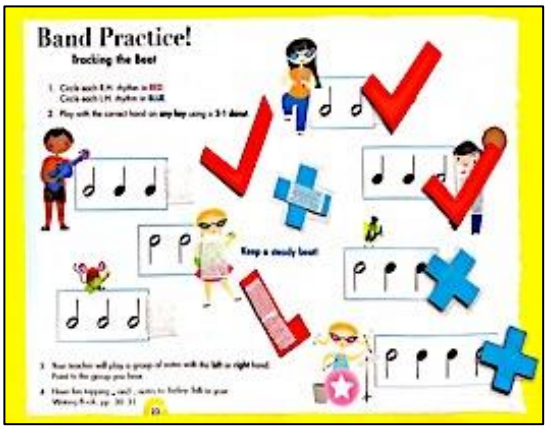

Figure 5.79: Band practice activity (Faber & Faber, 2006a:47)

The half note was reinforced in the theory book, *Turkey Talk* (Faber & Faber, 2006b:30-31) (Figure 5.80), and learners had to draw two quarter notes for each half note.

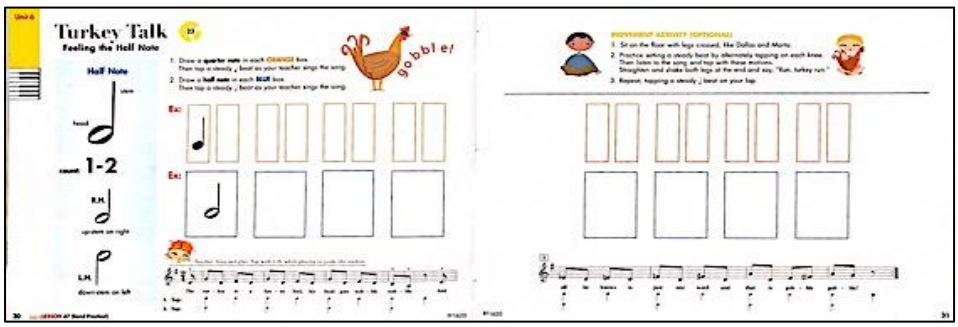

Figure 5.80: Turkey talk (Faber & Faber, 2006a:30-31)

The activity was compacted, minimising visual information in the theory book, *Half Note* (Figure 5.81)

[70] The blue crosses were not used to indicate incorrect notes; it was rather used to show which notes would be played with the left hand.

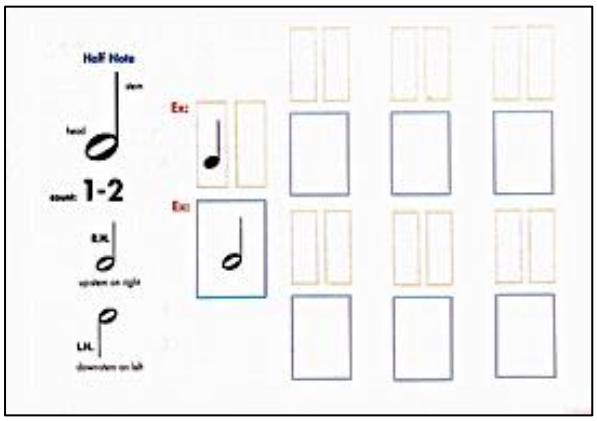

Figure 5.81: Half note writing work (Faber & Faber, 2006a:30)

Learners were asked to play the piece *Monsieur Mouse* in the Lesson book (Faber & Faber, 2006a:48-49) (Figure 5.82) with continuous guidance, while using the *Steps to read music* guide.

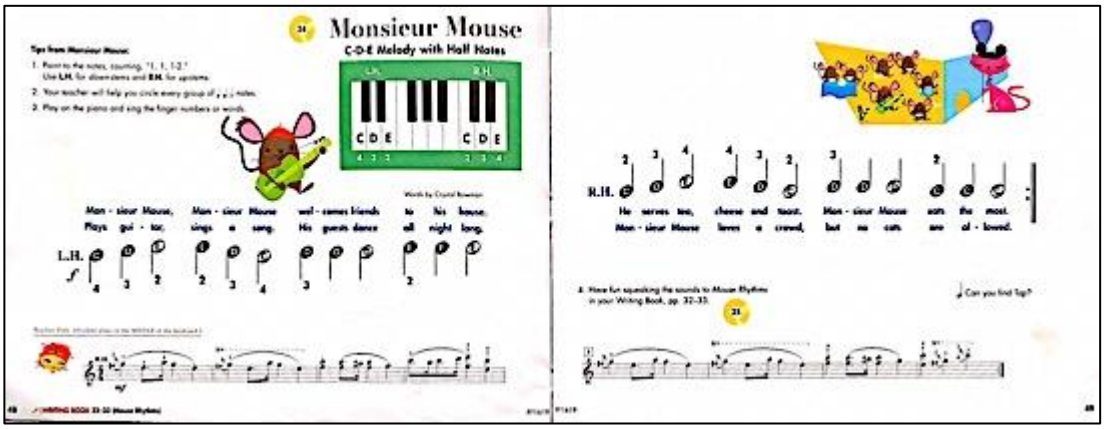

Figure 5.82: Monsieur mouse (Faber & Faber, 2006a:48-49)

After learners were familiar with the piece *Monsieur Mouse,* a creative activity *My Own Mouse Melody* (Figure 5.83) were created to reinforce melody notes C-D-E and rhythm patterns. Note patterns from the piece *Monsieur Mouse* were cut out and learners were asked to place them in a different order, making a melody in the left and right hand. The focus of the activity was to give learners the opportunity to make their own decision on how they would like to organise the rhythm patterns and melody notes.

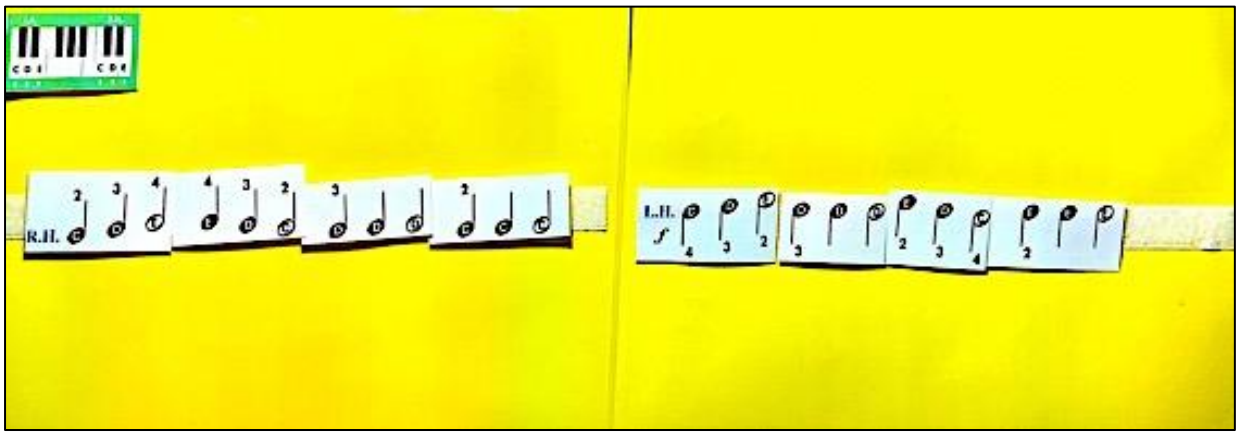

Figure 5.83: My own mouse melody

The accompanying activity *Mouse Rhythms* (Faber & Faber, 2006b:32-33) in the theory book (Figure 5.84) reinforced different rhythm patterns, using the quarter and half note time values. Rhythm patterns were cut out, allowing learners to create a rhythm (Figure 5.85). I asked them to play the rhythm patterns on note 'E' while playing and counting the correct rhythm pattern (short, short, lo-ong). After they had grasped the feel for the rhythm pattern, I asked them to make a mouse sound counting E, E, E- e, and then sang it with them as a duet.

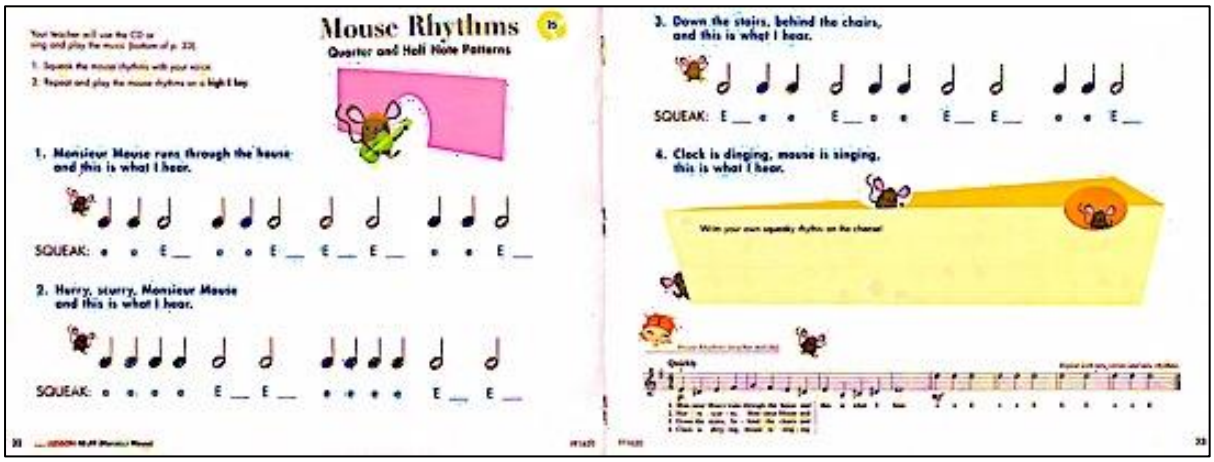

Figure 5.84: Mouse rhythms (Faber & Faber, 2006a:32-33)

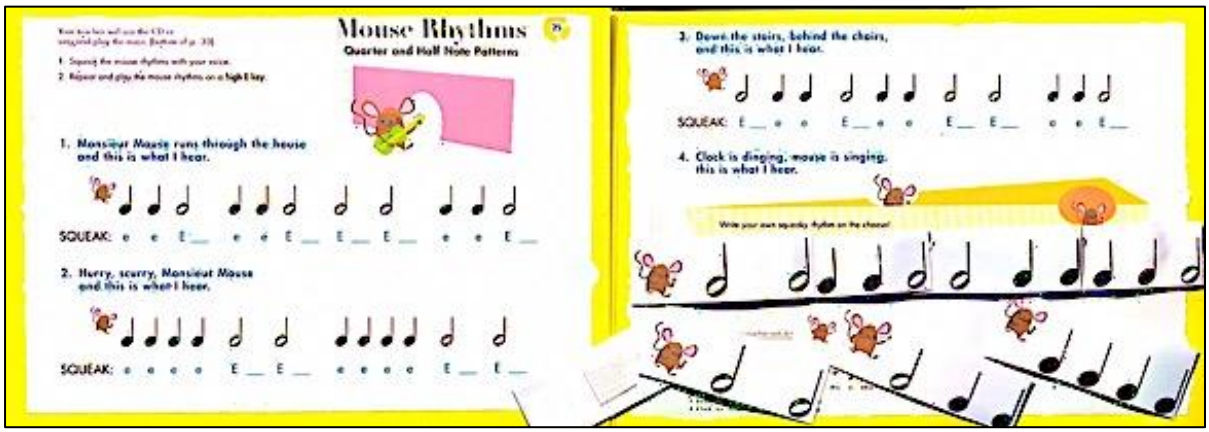

Figure 5.85: Mouse rhythms activity (Faber & Faber, 2006a:32-33)

The rhythm patterns learned in the activity *Mouse Rhythms* were reinforced in *Creative and Adapted Mouse Rhythms* (Figure 5.86) and learners were asked to use the patterns making a line of rhythm patterns.

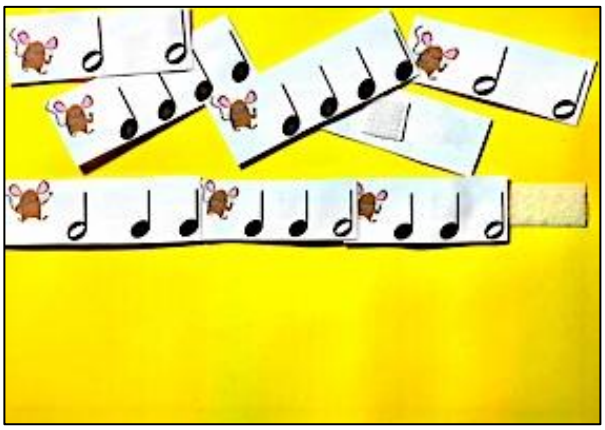

Figure 5.86: Creative and adapted mouse rhythms

The piece *Raccoon's Lullaby* in the Lesson book (Faber & Faber, 2006a:50-51) (Figure 5.87) was taught using *Steps to read music* and additional work in the theory book was completed in class by practising sight-reading in *Animals Riddles* (Faber & Faber, 2006b:34) (Figure 5.88) and ear-training in *Red Cat, Blue Cat* (Faber & Faber, 2006b:35) (Figure 5.89). Learners were asked to sight-read the piece, *Animal Riddles,* with minimal support from me, while using the structured questions in *Steps to read music* guiding them through the process. The piece was then given as homework.

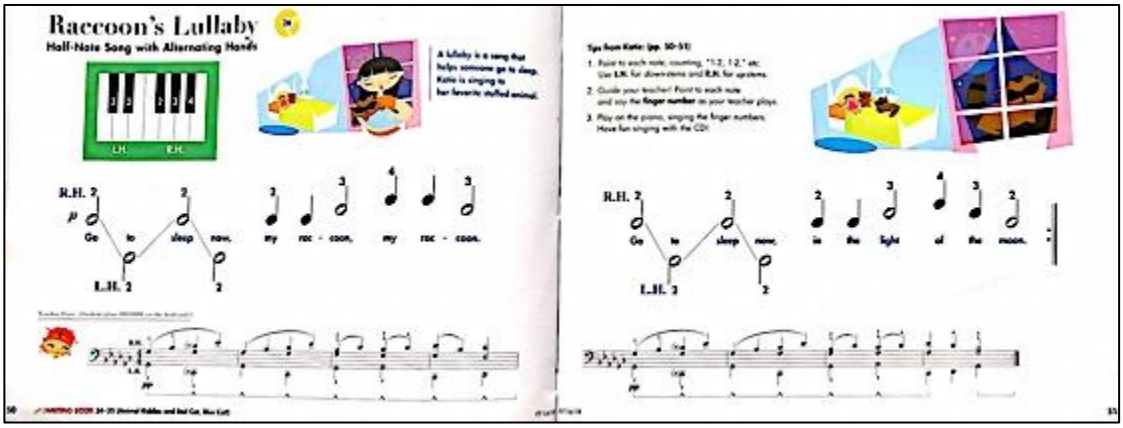

Figure 5.87: Raccoon's lullaby (Faber & Faber, 2006a:50-51)

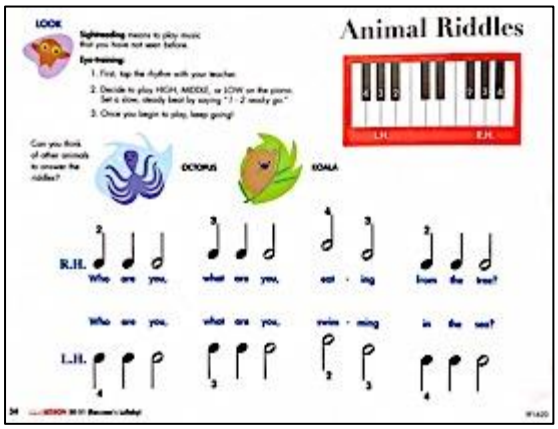

Figure 5.88: Animal rhythm (Faber & Faber, 2006b:34)

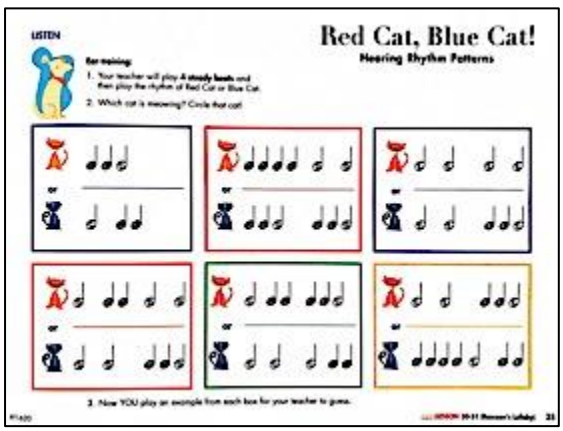

Figure 5.89: *Red cat, blue cat (Faber & Faber, 2006b:35)*

In the worksheet activity *Red Cat, Blue Cat* in the theory book (Figure 5.90), learners had to recognise the rhythm pattern played on the piano and place the tick at the correct notes. They were asked to first play the rhythm pattern in each block to

familiarise themselves with the rhythm pattern before I played it. The reason for this was to minimise anxiety and allow them to visually see the pattern and hear what it would sound like before they had to identify the correct pattern.

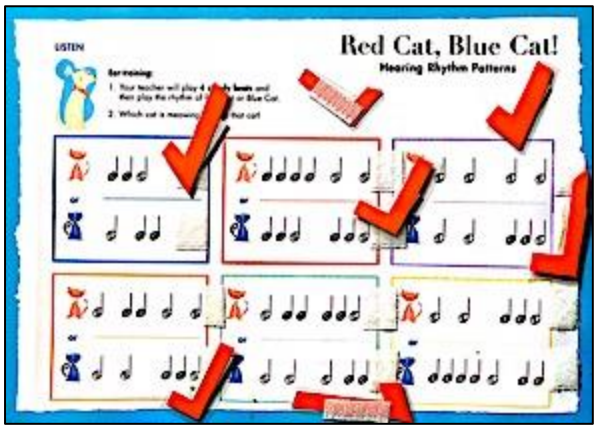

Figure 5.90: Red cat, blue activity (Faber & Faber, 2006b:35)

The low and high sounds were connected to the Bass and Treble Clef in the Lesson book (Faber & Faber, 2006a:52-53) and reinforced in the activity *Bass or Treble Sounds* (Faber & Faber, 2006b:36-37) in the theory book. Learners were asked to identify which sound they heard, a low sound in the bass clef or a high sound in the treble clef, reinforcing the different clefs (Figure 5.91).

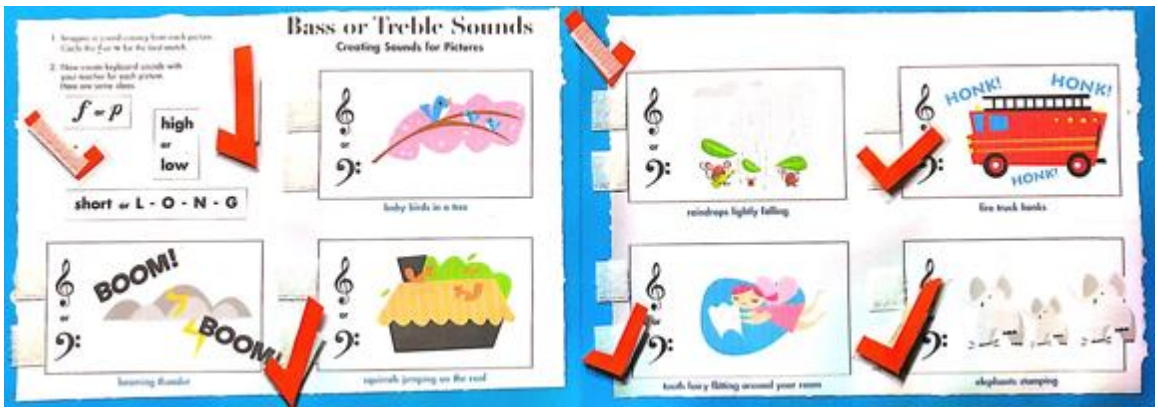

Figure 5.91: Bass or treble sounds (Faber & Faber, 2006b:36-37)

The song *Mary's Rockin' Pets* in the Lesson book (Figure 5.92) was given as classwork and learners were asked to practise rhythm patterns and note names C-D-E. The activity *Melody for a Dragon Kite* in the theory book (Faber & Faber, 2006b:38-39) reinforced the note names and letters C-D-E were made. Learners

were asked to use the letter names to compose a melody in a creative and fun manner (Figure 5.93).

Figure 5.92: Mary's rockin pets (Faber & Faber, 2006a:54-55)

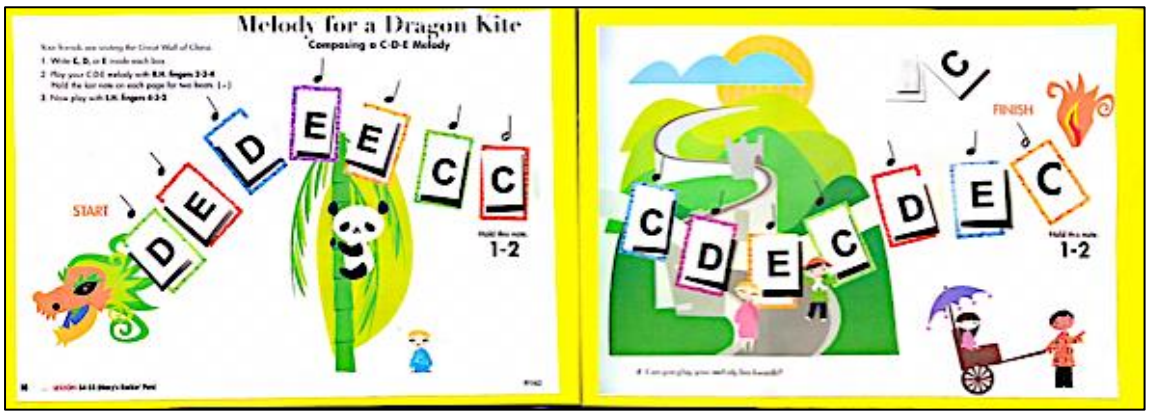

Figure 5.93: Melody for a dragon kite (Faber & Faber, 2006b:38-39)

I used the *Play a Song* activity to reinforce the half notes and stem direction. Learners were asked to apply their knowledge and compile a half note rhythm, by using both the right and left hand. The treble and bass clef were used to indicate which hand would play the notes. I reminded them that the treble clef would be at the top and the bass clef at the bottom. The bird and frog figures were also used to indicate high and low sounds.

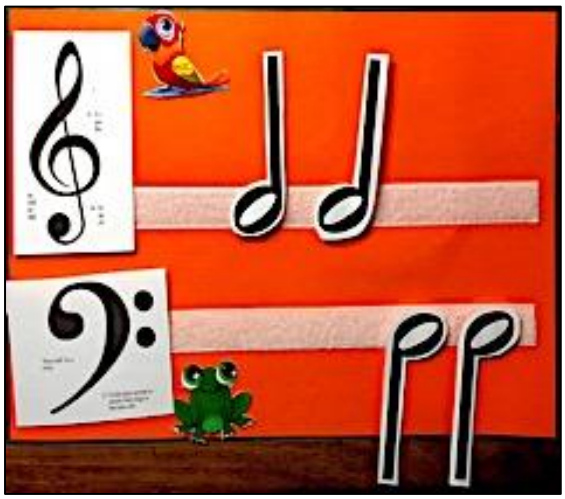

Figure 5.94: Play a song using half notes

5.1.7 Unit Seven[71]

The primary music concept taught in Unit Seven was the whole note. Previously learned note values were reinforced in pieces including the quarter notes and half notes. Unit Seven consists of two work pages *Whole Note = 4 Beats; Train Rhythms* and two off-staff pieces *Old Pic-Donald* and *Shepherd Count Your Sheep.* The Unit started with the work page *Whole Note = 4 Beats* (Faber & Faber, 2006a:56) in the Lesson book (Figure 5.95) and learners were asked to clap the whole note by counting ve-ry-lo-ong in time with the metronome.

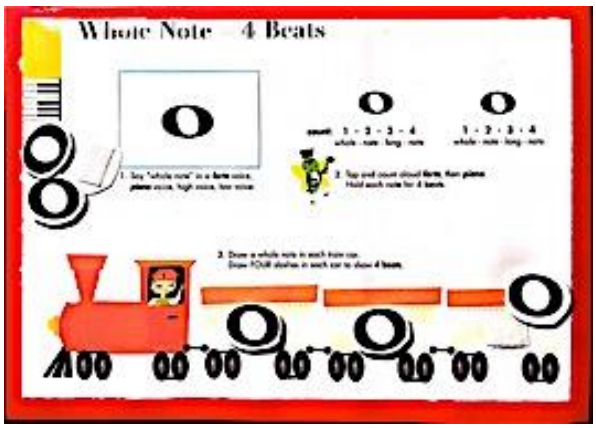

Figure 5.95: Whole note = 4 beats (Faber & Faber, 2006a:56)

[71] Unit Seven, from the *Lesson Book* as well as the *Theory Book*.

The activity, *Old Mac's Chick* (Figure 5.96), in the theory book was used to test learners' music knowledge in a fun manner and they had to find and identify music concepts with minimal support.

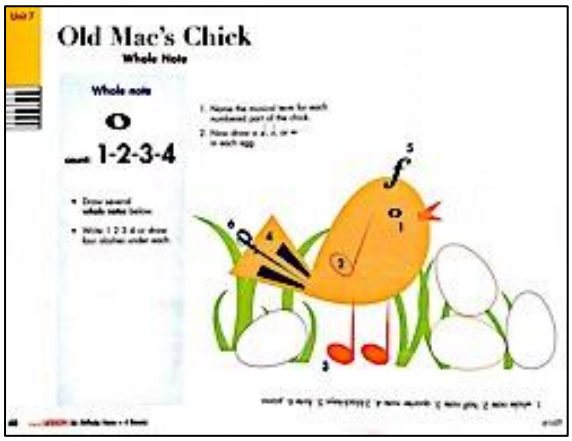

Figure 5.96: Old mac's chick (Faber & Faber, 2006b:40)

The lesson carried on to the activity, *Train Rhythms* (Faber & Faber, 2006a:57), and was reinforced with the note value activity in the theory book, *A Game of Beats* (Faber & Faber, 2006b:41). Small whole note, half note and quarter note values were cut out, which learners had to place at the correct image, displaying one, two or four beats (Figure 5.98). The small notes helped to practise fine motor skills and coordination as learners had to pick it up and place it at the appropriate picture.

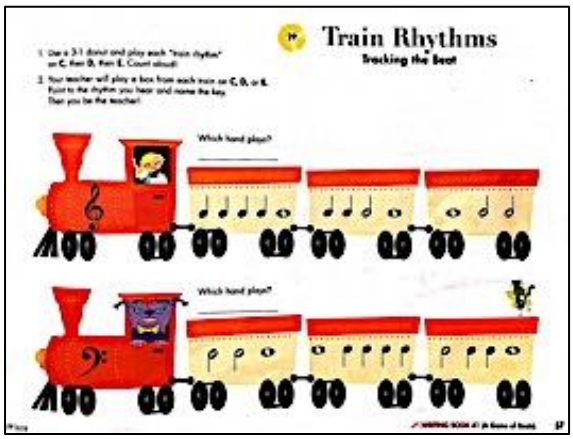

Figure 5.97: Train rhythms (Faber & Faber, 2006a:57)

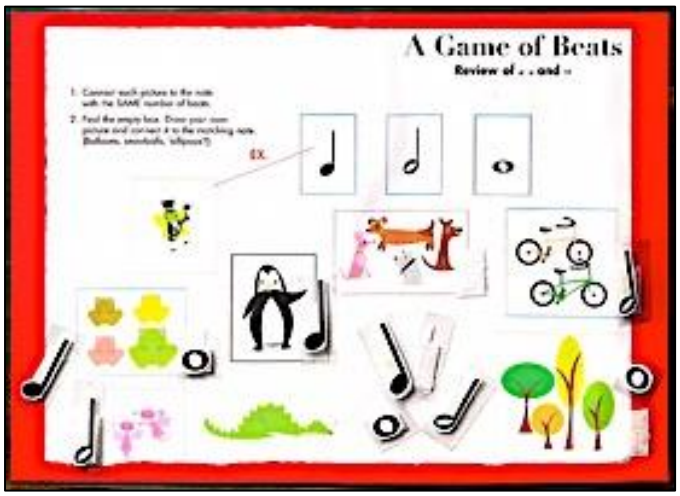

Figure 5.98: A game of beats (Faber & Faber, 2006b:41)

Learners were asked to play the song *Old Pig-Donald* (Figure 5.99) in the Lesson book, using the *Steps to read music* guide. Continuous support was necessary and learners were reminded about the new whole note value.

Figure 5.99: Old pig-donald (Faber & Faber, 2006a:58-59)

The quarter note, half note and whole note were reinforced in the activity, *I Feel Rhythm* (Faber & Faber, 2006b:42-43) in the theory book (Figure 5.100) and learners had to practise drawing the note values.

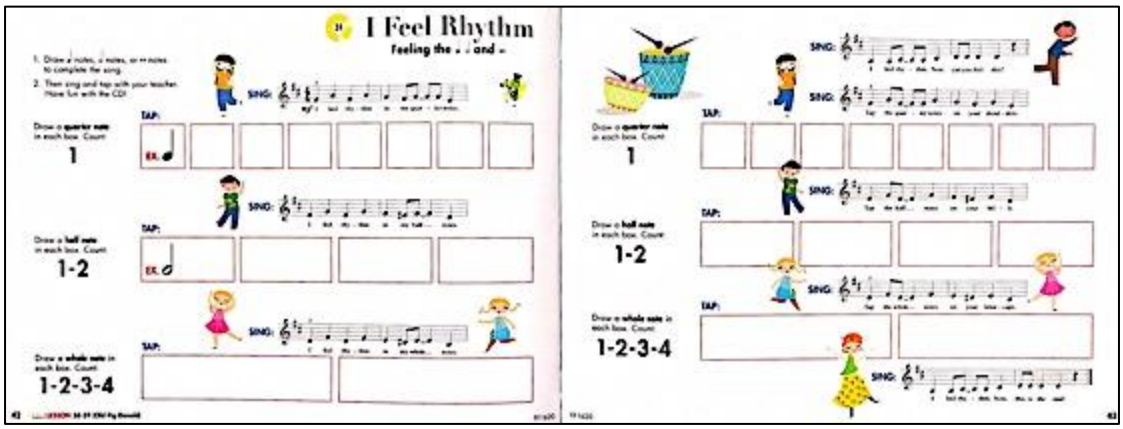

Figure 5.100: I feel rhythm (Faber & Faber, 2006b:42-43)

The Unit concluded with the song, *Shepherd, Count Your Sheep* (Figure 5.101) in the Lesson book and the two activities, *Shepherds, Count Your Beats* (Figure 5.102) and *Fruity Faces* (Figure 5.103) in the theory book. Learners confidently played the piece, *Shepherd, Count Your Sheep* with the necessary support, clapping the rhythm and using the *Steps to read music* guide.

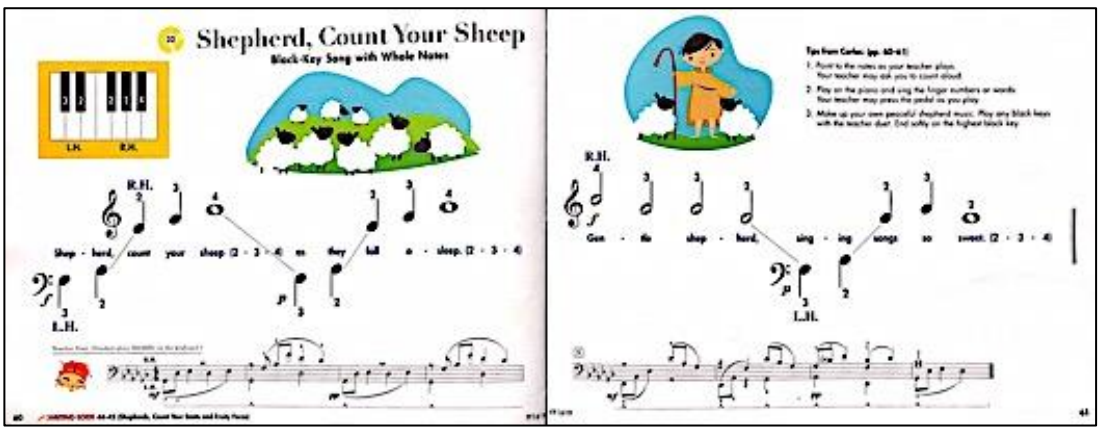

Figure 5.101: Shepherd, count your sheep (Faber & Faber 2006a:60-61)

The activity, *Shepherds, Count Your Beats* was completed in class and continuous support and prompting was necessary for learners to identify and clap the short, lo-ong and ve-ry-lo-ong time values.

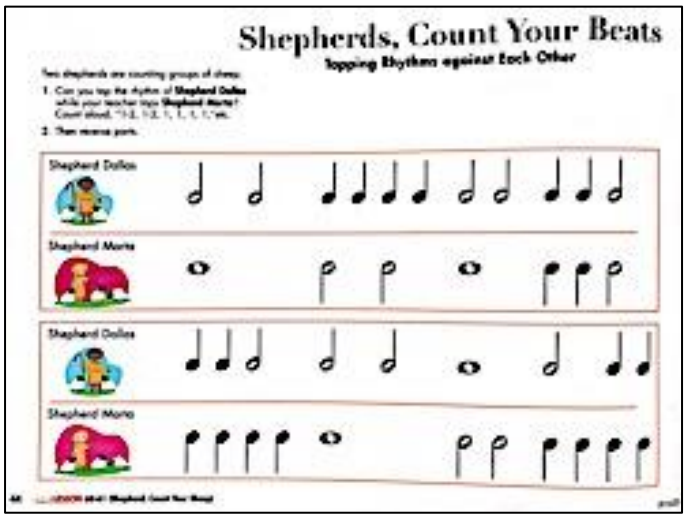

Figure 5.102: Shepherds, count your beats (Faber & Faber, 2006b:44)

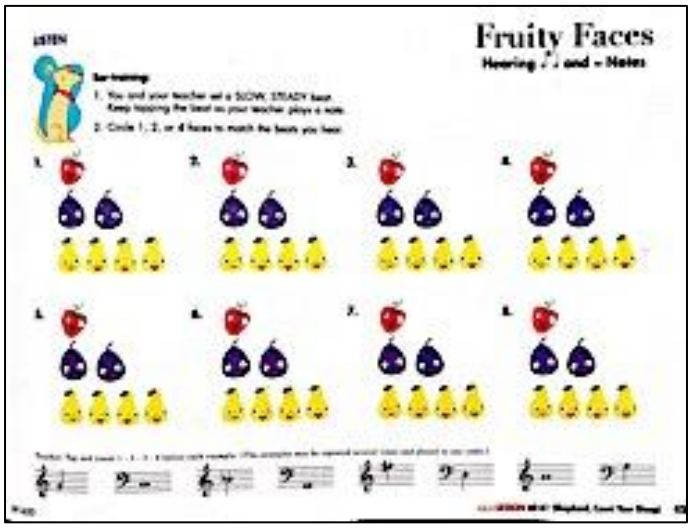

Figure 5.103: Fruity faces (Faber & Faber, 2006b:45)

The activity, *Fruity Faces,* in the theory book was a fun ear-training activity where learners had to listen to the note value played and identified how many beats they heard. The worksheet was slightly changed and instead of circling the correct amount of fruit on the work page (Figure 5.104), learners had to listen to the note value played and then place the correct note value indicating the right amount of fruit.

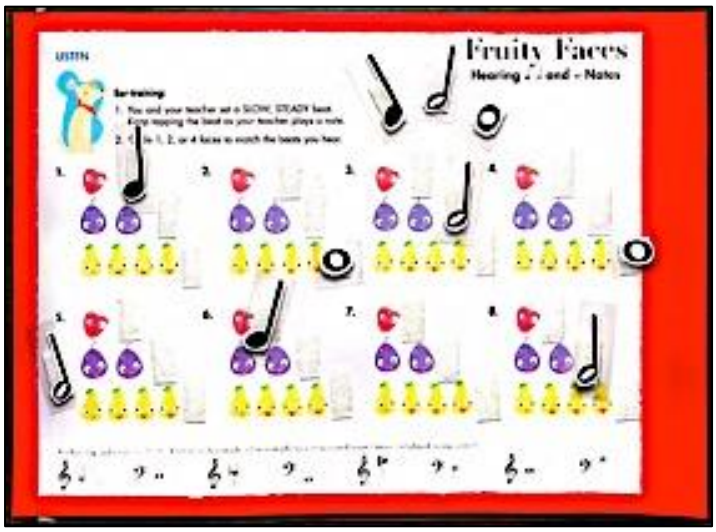

Figure 5.104: Fruity faces and velcro notes (Faber & Faber, 2006b:45)

5.2 CONCLUSION

The adaptation of piano teaching activities in the books was made according to suggestions for trusted methods found in the literature review. The simplification of activities and minimising of words were beneficial in the piano lessons, as was the use of Velcro strips at the back of ticks and crosses to show right or wrong answers. Homework activities were helpful for some participants, as they enjoyed working with the Velcro answers, putting them on the laminated page and being able to take them off. The additional laminated arrow, bird and frog prompts were found useful, as participants would stick them onto the fallboard to indicate the correct answer. Participants thoroughly enjoyed the concrete activity explaining *forte* and *piano* sounds and adaptation of the work material was found to be effective. Specific teaching material that was adapted or created due to difficulty experienced by one individual was often used for the rest of the participants as well.

An activity that participants experienced difficult to understand was *Stone on the Mountain,* in which learners had to imitate abstract hand movement in a playful manner learning to keep a rounded hand shape. The hand movement might have been too complex and abstract for some participants and learners were asked to make a fist instead and gently open it. Another activity that caused confusion was *Dallas Dips L.H. Donuts*, explaining the keyboard direction. Participants did not understand that down on the keyboard means playing notes from right to left and a

more visual explanation had to be used. Arrows, frog and birds were created to work from the participants ‘known’ knowledge from a frog jumping low on the ground or at a tree bark to a bird flying high in the air or sitting in the leaves to explain low and high sounds on the piano. The explanation of the frog and birds as well as the visual *Low and high sound* activity seemed more successful.

Abstract learning material was found more difficult, and continuous reinforcement of technique movements, such as the flexible wrist movement in *Mitsy’s Cat Back*, was necessary to solidify the work. Some participants also found it difficult to understand the meaning of words, which had to be simplified, and weak muscle control, strength and coordination often made it difficult for individuals to play piano. Each participant developed on his/her own pace, which will be discussed in the following chapter.

CHAPTER 6: DISCUSSION OF INDIVIDUAL PARTICIPANTS

Each participant's development over the six-month period was examined and includes information of the medical background and sensory sensitivity. The individual progress that was made, if any, and the period it took to understand concepts were evaluated, along with specific adaptations used to explain music ideas. The medical background, my personal entries into the journal, observation notes, specific adaptations made for the participant as well as the parent and teacher interviews and questionnaires are hereby discussed.

Table 6.1: Piano lessons attended, and time spent learning music concepts

Participants	**Start with lessons on**	**End with lessons on**	**Lessons attended[72]**	**Time spent teaching a concept**
Andile	Friday 9/9/2016	Friday 31/3/2017	22	2 to 7 lessons
Andrew	Monday 5/9/2016	Friday 31/3/2017	24	2 to 5 lessons
Daniel	Friday 9/9/2016	Friday 31/3/2017	13	3 to 13 lessons
Dinesh	Monday 5/9/2016	Monday 27/3/2017	24	2 to 6 lessons
Lusanda	Monday 5/9/2016	Monday 27/3/2017	22	Approximately 3 lessons
Neil	Friday 9/9/2016	Friday 31/3/2017	23	2 to 7 lessons
Nina	Friday 9/9/2016	Friday 31/3/2017	20	2 to 7 lessons
Paula	Monday 5/9/2016	Monday 27/3/2017	18	Approximately 2 lessons
Siyabonga	Monday 26/9/2016	Monday 27/3/2017	20	2 to 5 lessons
Tahir	Monday 5/9/2016	Monday 27/3/2017	22	2 to 4 lessons
Ulhas	Monday 26/9/2016	Monday 27/3/2017	18	6 to 8 lessons
Zoé	Friday 9/9/2016	Friday 27/3/2017	20	2 to 5 lessons

[72] This is from a possible 26 lessons. The reasons for participants missing piano lessons varied from illness, sensory sensitivity (being terrified of a thunderstorm due to auditory hypersensitivity), a meltdown, parental work obligations, family activities, or a participant refusing to come because he/she preferred to swim.

6.1 ANDILE

Aspects that Andile had difficulty with were the sitting position, keeping a rounded hand shape, finger numbers involving playing with individual fingers, muscle coordination, and weak muscle strength, as well as both gross and fine motor skills. Challenges noticed in lessons included behaviour and high levels of anxiety. Difficult concepts such as direction took approximately seven weeks to understand, with continuous and systematic reinforcement in different pieces. Andile would often get frustrated if he did not understand the work or if he could not perform an action immediately.

I introduced physical and hand exercises to strengthen his rounded hand shape, muscle control and coordination. Andile often got fidgety or anxious when the work seemed too difficult or when he started to lose concentration. During the first three months of lessons Andile would often refuse to continue after a short break, and twice he did not even want to play the piano. I asked his father to move closer, which had a calming effect on him since he sat within an arm's length from his dad and could lean over to him. Instead of asking, "Do you want to take a break?" which could be understood literally, I would ask, "Do you want to continue or give dad a hug?" I noticed that hugging the parents, especially for Andile, had a calming effect on participants, allowing them to move away from the piano to a familiar person and a safe zone. Parents would often encourage and praise the child while embracing them. At the end of the six months Andile could confidently sight-read easy off-staff piano pieces with minimum supervision and prompting.

The parent interview revealed reluctance to play the piano during the first eight weeks; it was only after Week 9 that Andile enjoyed coming to the lessons and even insisted on his lesson. According to his mother he enjoyed doing the piano homework and homework activities with his dad, imitating hand movements and repeating words. He listened to the videoclips and would play it on the keyboard. Andile seemed calmer since he had started with piano lessons. However, his parents were not sure whether it was the results of the piano lessons or medication, since he had begun with both at the same time. His mother was convinced that the piano lessons and everyday practice helped him, as he no longer lashed out against his

class teacher or peers. According to his mother he was much more affectionate, giving his parents hugs, and had started to speak words from their indigenous language. In Week 25 of piano lessons his mother noticed that he no longer asked to go to his dad or said, “I want a break”; instead he continued with lessons.

Both the parent and teacher interviews revealed an improvement in his handwriting, and after six months his teacher said, *“*He writes, he writes! He does not scribble; he writes and will copy his work from the board …*”* Andile started to take responsibility for his schoolwork, and both the parent and teacher noted an improvement in his confidence as well as the ability to ask for help and to complete work. According to the teacher, there was a “great, great improvement” in his ability to sit still. His language improved; including receptive, expressive and comprehension as he followed instructions and understood what was said. They also noted that his learning ability, hand coordination and fine motor skills (like his cutting skills, colouring and pencil grip) improved. Andile's mother mentioned a change in his motor development and wrote that he ceased to tippy-toe. The six-month teacher questionnaire showed that Andile could cross the mid-line and improvement was observed in his motor development, as he could participate in obstacle courses. Andile’s mother also mentioned that his reading skill and concentration had improved and that he read with understanding

There was a change in Andile’s emotions and behaviour, and he seemed more relaxed and less sad, anxious or upset. He was also more vocal than before and stopped biting his nails. The teacher noted that he was a happier child and wrote, “Andile tries and does not get easily upset.”

6.2 ANDREW

Difficulty was experienced with Andrew’s behaviour towards piano lessons. This hampered his development at first, as he would often yawn or act in a manner showing that he was not interested in the lesson. The problem was addressed by speaking to the parents and the mother decided that it might be wise for her not to sit in during the lessons. This had a positive effect and he started to participate and communicate more often.

Andrew had a good understanding of music concepts learned in the lessons. However, he experienced difficulty in understanding and reading finger numbers and notes moving down on the page, from the top left to the bottom right, and to connect it to the direction down on the piano, from right to left. He would often get anxious when he did not understand concepts or if he could not do an activity, like playing with individual fingers due to weak muscle coordination. I continuously prompted him using visual aids, such as arrows, to solidify the direction moving down. Andrew experienced difficulty in playing sideways and would walk down the piano with his fingers. I used the image of a crab to demonstrate the sideways movement. Physical and hand exercises were introduced to strengthen his fingers and keep a rounded hand shape by making him press a washing peg, a stress ball or newspaper and to pull an elastic band. After six months of piano lessons Andrew could confidently identify the C-D-E notes on the keyboard and play off-staff piano pieces with a rounded hand shape.

Interviews with his parents revealed that Andrew enjoyed both the piano lessons and homework. However, he preferred the laminated homework pages to the videoclips. According to his mother, Andrew could watch a maximum of two clips, but seemed to ignore the videos, and he preferred practising the two-black-key groups on his keyboard while saying “two and three black keys”. This repetitive action had a calming effect on him. A positive change in his emotions and behaviour were noticed, and his father mentioned, “He is a lot calmer and his emotions are more stable. It (music) gives him an outlet.” The teacher observed fewer anger outbursts. An improvement was noticed in his discipline, responsiveness, ability to focus, being persistent, patient and in his social skills. He communicated more meaningfully, expressing himself a little better and he began to reason things out. His articulation and sentence construction improved and he would wait for his turn to talk. Andrew’s learning ability and concentration improved. However, the teacher wrote that the change might be due to medication and that his concentration fluctuated a lot in class.

The parent and teacher questionnaire showed an improvement in his motor development (as he could run, climb more easily and catch a ball with ease), his hand coordination and fine motor skills (as his bookwork, writing and colouring in

were neater). His father also mentioned that he could handle tiny objects better like playing with small Lego blocks, which he could not do previously. Andrew's body movement was much more coordinated, unforced and free.

6.3 DANIEL

Music concepts such as finger numbers, direction and differentiating between his left and right hand needed more time, and he seemed to have a good understanding of the rounded hand shape after three weeks. Daniel enjoyed playing 'random' notes on the piano and could sometimes count and play finger numbers in order (one, two, three, four, five). Other times he would however play with one finger while counting "One, two, three, four, five, six, seven, eight, nine, ten." He resisted changing the finger number order and would often connect a number with the wrong finger. I made elastic bands with images on to help him distinguish between his left and right side and adapted the finger number activity. Daniel did not comprehend that a specific number went with a particular finger and I created colourful fingers in which each finger and number had the same colour. I found that the activity was not successful and more time was needed to reinforce and solidify the concept.

Various challenges were noticed, including communication, weak muscle strength and difficulty in understanding abstract music concepts. Daniel's style of communication consisted mainly of echolalia, self-created sounds and pointing to or demonstrating activities like the 'cat-back' curving his back on the carpet. He would often get restless when the lesson seemed too long or when he lost concentration, and in some cases, he got up and walked away from the instrument, indicating that it was the end of the lesson. I incorporated physical exercises during piano lessons, which Daniel thoroughly enjoyed. However, after six months he was still uncertain about music concepts taught in class and could not identify finger numbers, direction or play off-staff piano pieces.

The parent interview revealed that Daniel was excited about coming to piano lessons. He would often play and sing on his little toy piano when he felt like it; repeating words and actions learned in the lessons. According to the parent interview, Daniel enjoyed the laminated pages as well as the videoclips. He would

watch the videoclips and then do the actions on his little piano. His mother observed a change in his behaviour towards music and dancing as he was much more confident and even danced on stage at school. According to his mother, his speech developed and he received a prize for 'most improved speech'. The parent and teacher questionnaire showed a positive change in his emotions, behaviour, social skills and communication. Daniel seemed a lot calmer and happier and he was less sad, anxious and upset. The teacher and parent revealed that he was more focused compared to when he started with lessons and he showed an improvement in his learning ability and concentration.

Both the parent and teacher noted an improvement in his hand coordination, fine muscle control (Daniel's pencil grip, writing, cutting, colouring skills and letter formation improved) as well as his motor development (as he could catch a ball and climb a jungle gym). His mother noticed that Daniel would sit still for more extended periods.

6.4 DINESH

Aspects that he had difficulty with were the sitting position, rounded hand shape, identifying finger numbers and playing them in a different order. I also noticed he had a problem in determining the left and right hand, direction, high and low sounds as well as quarter notes. Dinesh would often give the correct answers one week while experiencing difficulty the following week. He did not understand the abstract activity used to explain the rounded hand shape; neither could he imitate the actions. I used a more concrete explanation by asking him to place his fist on the piano keys and gently open it. This was better understood by Dinesh than other participants did. Various challenges were experienced in class, including communication difficulties, behavioural challenges, weak muscle strength, poor coordination, difficulty in both gross and fine motor skills and understanding abstract musical concepts. Dinesh's style of communication varied between the use of sounds such as *Bloe-Blue; Blah-Black; Wa-One* and pointing to images.

His muscle strength and coordination were weak, creating difficulty in playing with individual fingers, learning piano techniques and music concepts. He would often

play all the notes together, as he found it difficult to play with individual fingers. Particular attention was given to finger activities such as squeezing a stress ball and playing one note numerous times fast and loud with one finger. He could keep the correct rounded hand shape technique with minimal assistance after the fifth piano lesson and a slight improvement was noticed in his muscle and finger strength playing with individual fingers after three and six months, respectively. Physical exercises were incorporated, strengthening core muscles and improving body posture at the piano. Dinesh did not enjoy physical exercises; therefore, we did it before the piano lessons.

I noticed that he got upset if he was not understood or given the opportunity to explain himself. He would start to stim[73] and indicate colours in the piano book and environment when losing concentration. Dinesh enjoyed a 10 to 15-minute lesson, depending on his concentration and focus, but he wanted to leave immediately after the lesson. He would get emotional and angry if he had to continue after a short break. The amount of work completed in class depended on Dinesh's concentration and on the time spent identifying the colours he noticed on the page or prompts. He often turned the page indicating that he wanted to continue and the music technique or concept had to be reinforced at a later stage. After five months of lessons, Dinesh could play easy off-staff piano pieces with confidence and minimal assistance; however, prompting was needed to guide him through the pieces.

Interviews with the parents revealed that Dinesh enjoyed the piano lessons but did not enjoy the laminated piano homework and got extremely upset when requested to do it. It was only at the end of five months that he started to practise piano without complaining. Dinesh enjoyed the videoclips for homework and would spontaneously participate in the actions. According to his mother, "Lots of the stimming has stopped and now he is only doing it when he gets excited." After five months of piano lessons, Dinesh showed much more excitement and positive emotion towards music. He tried to communicate, making a lot more sounds. His mother informed me that

[73] Stimming refers to the stereotyped and repetitive behaviour of simple motor stereotypies such as hand flapping and finger flicking (DSM-5, 2013:54).

both the speech therapist and class teacher mentioned that the number of sounds he made had increased. The parent and teacher questionnaire showed an improvement in his social skills, communication and learning abilities. His mother wrote, “Not sure if it is only piano or a combination of piano and school.” Dinesh had much more confidence to do new activities in class and his focus, concentration and endurance improved. There was a change in his emotions and behaviour, as he seemed more positive, calmer, less sad, anxious and upset. Dinesh would get excited when his mother recited a ‘music term’ in a nursery rhyme.

An improvement was noticed in his fine motor skills (his pencil grip and ability to sharpen a pencil), his motor development and hand coordination. Dinesh started to use both hands simultaneously, whereas previously he would only use his dominant hand for activities and he could differentiate between his left and right hand. The teacher suggested that the piano lessons gave him additional exercises that enhanced the flexibility of his fingers, adding strength to his muscle tone, and equipping him with the ability to “do things he could not do before; like using keys and opening a door”, such as holding a ruler more firmly. Dinesh’s mother wrote that he could use different fingers.

6.5 LUSANDA

Lusanda experienced difficulty in differentiating between his left and right hand, understanding note values, stem directions, ear training, and keeping a rounded hand shape. Lusanda would often curl his fingertips in. He could apply one music concept at a time. However, continuous support and prompting were necessary and three months into the piano lessons I noticed that he experienced great difficulty when asked to identify two or more music concepts within a piece. I composed a structured *Steps to read music* list of questions with visual support, guiding Lusanda through the music pieces and helping him to identify one concept at a time before continuing to the next question. This systematic structure enabled him to play a piece with minimal support and created independence at the piano. He reacted well to one-on-one instruction and constant prompting, but experienced difficulty with expressive language. He often pointed to the laminated cards (for example, frog, bird, arrows) to give the correct answer.

I noticed that Lusanda got nervous when he had to identify music direction in an ear training activity. To minimise anxiety, I first asked him to play the two given options before identifying which one I played, allowing him to see the music visually, feel the direction and connect the sound to what he saw. Colourful prompts were used to help Lusanda differentiate between his hands, connecting a specific hand to the appropriate low and high tones, as well as the bass and treble clefs. Lusanda took a while before identifying the correct hand and needed time to process information. He thoroughly enjoyed the physical exercises and emphasis was placed on differentiating between the individual hands in the stress ball activity. Lusanda had a good understanding of basic musical concepts and had good muscle control, imitating actions accurately. After six months of piano lessons he could confidently sight-read basic pieces with minimum support and had a relatively good rhythmical understanding. He liked playing duets.

The parent interviews revealed that he thoroughly enjoyed the lessons. They noticed a slight change in his behaviour, as he seemed to be calmer, more focused, less sad and able to concentrate better, showing more confidence. Lusanda would sit still for longer periods of time doing school homework and enjoyed watching the piano videoclips. He would often say, “I know this Mommy, I know this”. During this time he would imitate hand movements and repeat words learned during the lessons. Both the teacher and parent questionnaires revealed an improvement in his social skills and communication. Lusanda tended to be more resilient, be less clumsy and had a steadier handwriting. He could also distinguish his left hand from his right hand.

6.6 NEIL

Difficult concepts such as direction, and high and low sounds took approximately seven weeks to solidify, with continuous reinforcement of technique and visual prompts. Neil started to make a high-pitched, squealing sound after the first piano lesson. According to his mother he had done this at a young age but had ceased to do it years before. It started again with the lessons, but she could not tell what triggered his behaviour. Nine weeks into the lessons Neil told his mother that he found the lessons too long. We immediately changed the lesson structure and asked Neil how many pages he would like to learn. He was content with two pages and the

lesson time was reduced to approximately 10 to 15 minutes, which were sometimes divided into five- and nine-minute lessons, depending on his concentration and ability to sit still. The squealing sound ceased and he appeared more compliant in class.

Neil did not experience significant difficulty with the adapted teaching material and could play basic piano pieces, with continuous support, after five months of lessons. However, behavioural and sensory challenges arose, which interrupted the lesson. This included random storytelling, rapid hand movements, a concentration span of approximately one minute before he would get restless, and proprioceptive difficulties. Neil experienced difficulty in sitting still and would lean against me, placing his feet on the chair or standing up. Physical activities were introduced in Week 16, which had a positive impact on his ability to sit still. He preferred doing the exercises before the lesson commenced and I noticed he had difficulty in controlling slow muscle movement while participating in the activities. To minimise his storytelling, I implemented turn taking; my turn to talk was during the lesson time and his was during the break. I found turn taking successful, as he would focus for a period while I explained the work. However, excessive talking was often an indication that he had a cognitive overload and needed time to process the given information. Neil often came across as being unengaged in the piano activities, as he would play random notes or play with the laminated prompts. However, he followed instructions and would play the requested sound correctly after a few seconds. Lessons were found to be more productive when proprioceptive dysfunction[74] and difficulties with attention were taken into consideration. After six months Neil could play basic off-staff piano pieces with continuous prompting and give the correct answers. His hands often collapsed on the piano and instead of keeping a rounded hand shape he played with straight fingers.

Interviews with his mother revealed that she initiated homework, and it was during these short sessions that Neil would repeat or imitate words and actions learned in

[74] According to Kranowitz (2006:88), poor proprioception affects the way an individual will position and move his/her body. Poor proprioception or *proprioceptive dysfunction* may cause an individual to lean against objects or people, invade others' body space and have a poor sense of body awareness.

the lesson. Neil started to enjoy piano lessons and his anxiety coming to lessons ceased. He preferred the videoclips to laminated homework and seemed to be more relaxed when watching the videoclips. Neil was less anxious in his daily routine after four months of piano lessons and his mother mentioned that she saw a definite change in his behaviour. He seemed calmer and less frustrated after five to six months of lessons. These changes were noticed both in home-schooling and home activities.

In the home-school environment, he could sit still for a period, concentrate and complete classwork, which had not happened before. One could observe an improvement in his learning abilities, capacity to focus for extended periods of time and slightly in his reading. He would also spend more time applying problem-solving skills before asking for help and showed more endurance and patience in class. Piano lessons had a positive influence on Neil and his mother noted that it taught him to persevere, as it was not strength or a natural talent. His motor development improved slightly and he enjoyed dance movements and began to sing songs, not screaming words.

6.7 NINA

Aspects that she had difficulty with were direction, low and high sounds and learning the note names C-D-E. Nina would often get emotional because of something that had happened at school or before the piano lesson, as well as when she did not understand the piano work explained to her, or if she had to process too much information at once. I therefore had to adjust the piano lessons according to Nina's behaviour and reaction in class, using simplified words in the lesson and instead of saying 'together' I used 'same time'.

Nina did not understand abstract activities and needed more concrete and visual information. She experienced difficulty identifying the white keys C, D, E at the group of two black notes and to play with the teacher duet, keeping a steady beat while listening to the melody. I asked her to count the rhythm aloud, giving me an idea when she would play the next note and allowing me to fit the teacher duet into her melody. Nina had a good understanding of the adapted teaching material, but words

were understood literally and often had to be simplified. After six months Nina could play easy off-staff pieces with minimal to no support, although she found it difficult to keep a steady beat. Piano lessons did not only require adapting teaching material, but also emotional support and adjustment as her behaviour and mood could change rapidly. She would often hit her legs if she was upset and I made time to listen to her and channel her attention back to the piano lesson.

Interviews with the parent revealed that Nina was calmer immediately after a piano lesson and she enjoyed practising the piano at home. However, Nina did not practise the piano when emotional. Her mother mentioned that playing the piano seemed to have a calming effect on her and a change in her emotions were noticed at home, as she was less sad, anxious and upset. Both the parent and teacher noticed an improvement in Nina's concentration and focus. Nina could complete her homework without getting distressed and an increase in her reading ability as well as her spelling was noticed at school; she also reacted better to being corrected. There was an improvement in her social skills, communication, learning abilities, attention and memory. According to her mother, the piano lessons were therapeutic for her. Nina was more mature, learning to do something that she could not do before and she was happier. The class teacher observed "an improvement in maturity and less self-centeredness".

An improvement was noticed in Nina's hand coordination (like being able to cut a cucumber or tomato holding it with one hand, while cutting with the other hand), fine motor skills (neater writing, better finger/hand control, being able to tie her hair) and motor development. Nina's class teacher noticed that she could differentiate between writing capital and small letters and started using spacing between words. Nina spoke about piano lessons during school and played *Twinkle, Twinkle Little Star* for her class.

6.8 PAULA

Paula experienced difficulty to keep a good posture, sitting up straight and tall, and her body would often collapse, or she would slouch. I observed that her muscle tone and control were poor and she complained about tiredness and body ache when

asked to correct her body posture or to keep her wrist up. Her one hand would often support the other hand while playing, as her wrist tended to collapse on the piano. I asked her to show me her knuckles. Visually seeing her knuckles helped her to keep the wrist up and to hold a rounded hand position. To remind her to sit up straight and tall, I placed a little bunny on her head (Faber & Faber, 2006a:7), and I had to simplify language and shorten sentences when speaking to her. She experienced difficulty understanding instructions or explanations and would ask, “What is distance” and mentioned that she could not read.

Paula’s imitation of activities learned in class was good, although she found it difficult when she had to apply it within an easy music piece. I noticed that singing the finger numbers, hand movement and fingertips helped Paula to play the melody while using the correct technique. The comorbidity between ASD, sensory sensitivity, including hyposensitive in proprioception and inattentive type ADHD, influenced the piano lessons as Paula would often lose concentration, get restless and complain about body ache. Physical activities were incorporated and had a positive effect on her, allowing her to move around, feel her body in space and align her focus with the piano work again. After 13 lessons Paula could answer basic questions about an off-staff music piece and with constant prompting and assistance she was able to perform with technical ease.

The parent interviews revealed that Paula reacted positively to the piano lessons and enjoyed doing the piano homework, during which she would repeat phrases and hand movements learned at lessons. She did, however, not enjoy watching the videoclips for homework and would play the piano when feeling upset or overwhelmed. A change in her emotions and behaviour was noticed as she was less sad, upset and Paula seemed more relaxed, calmer and communicative at home after approximately two months of lessons. Her mother wrote, “She is not angry and slamming doors any longer”. There was an improvement in her social skills, learning ability and her concentration. Paula’s mother, who was also her teacher at school, noticed that her thoughts became far more logical; she was more tolerant and better to get along with at home and in class. She had also not had a meltdown due to anxiety since she started with piano lessons.

Piano lessons had a positive influence on Paula. Her mood improved, she was a happier child and highly motivated by music. Her mother also mentioned that Paula was more content at the keyboard with improved motor planning, mastering piano work after only one lesson, playing piano pieces in different locations and that the increase in confidence and competence permeated all aspects of her life. There was an improvement in her hand coordination as well as muscle and finger strength and her typing improved.

6.9 SIYABONGA

Siyabonga did not understand basic instructions and experienced difficulty in giving answers to music questions. I noticed challenges in communication and abstract music concepts and language had to be simplified in the class by making use of core words supported by visual prompts. Concepts had to be demonstrated numerous times while giving a short explanation. Aspects that he had difficulty with were the black and white keys, direction and identifying the high and low sounds. I also noted that he could not recognise whether notes were moving up or down or stayed the same and I explained direction by breaking it up into two segments, creating the activity, *Does the music go up or down, or stay the same?* The first was to identify if the notes were the same or different and the second whether different notes were going up or down. The activity was found successful, as Siyabonga could identify the direction notes moved into.

He often indicated that he would like to revise a previously learned piece by pointing or turning to a specific page. He thoroughly enjoyed playing the piano and working out pieces by ear. I noticed that, although he could play the instrument by ear, he experienced difficulty in connecting learned music concepts and written work with ear training activities. Siyabonga could not identify in which direction music was played during the ear-training activity and would imitate my actions or play the correct notes by ear without giving me an answer. I noticed that he would start to play around with sound on the keyboard when losing concentration. Both his mother and I would call his name, thus bringing his attention back to the piano lesson. He would often lean to his left side, supporting his body with his arm. After six months,

Siyabonga could play easy off-staff piano pieces with continuous prompting and he thoroughly enjoyed playing duets.

Interviews with the mother revealed that Siyabonga enjoyed the piano lessons and homework. He would often demonstrate echolalia,[75] repeating phrases, and echopraxia, repeating hand movements learned. Repetition predominantly took place while doing homework with his mother. During the lessons, his mother would often record sections on her cell phone to play at home. However, she found that the videoclips were more helpful, better understood and were preferred above the laminated homework pages. Siyabonga watched each videoclip before imitating the actions and playing them.

Both his mother and class teacher noticed an improvement in his ability to socialise, interact and communicate. According to Siyabonga's mother, his responsiveness improved and he showed more patience and endurance when completing activities. She also mentioned that "he is more respectful and obedient". There was a change in Siyabonga's emotions and behaviour, and he seemed less sad, anxious, upset and his mother wrote, "He is calmer and more controllable." Siyabonga's learning ability, concentration and focus improved and he could sit still for more extended periods of time and listen more attentively to instructions. The teacher observed that Siyabonga ceased to walk up and down the school corridors and started to sit at his school desk. The teacher and mother noticed an improvement in his hand coordination, fine motor skills, motor development and both the teacher and parent wrote that he could use both hands simultaneously.

6.10 TAHIR

Aspects that Tahir had difficulty with were direction, as well as high and low sounds. Tahir did not understand the verbal explanation, and I used the arrows, frogs and birds prompts to visually support music concepts, which he understood better. I noticed challenges in his ability to demonstrate his knowledge, as well as his

[75] The DSM-5 (APA, 2013:54) describes echolalia as the delayed or immediate parroting of heard words.

understanding of verbal instructions and Tahir would often use visual prompts to communicate by pointing to them. He also experienced difficulty in keeping a rounded hand shape while playing with individual fingers, as his wrist would often collapse. Tahir had a relatively good understanding of music concepts taught during the piano lessons and, with adequate prompting, he was able to apply them in lessons to follow.

He was a curious little boy and did not enjoy repeating piano work numerous times to solidify music concepts. He would indicate that he wanted to continue by turning the page. Music theories and technique were therefore often reinforced within a new piece or activity. I noticed that Tahir would often give the correct answer when I asked him to indicate if he should place his hands on a group of two or three black keys. However, instead of recognising the black-key groups, he would say the finger numbers 2, 3, 4 that were written on the black keys. He would then place his hands in the correct position. Tahir could confidently identify whether notes and finger numbers moved higher, lower or were repeated, playing it correctly. However, when playing or sight-reading a new piece, he could not identify whether the music notes or finger numbers moved down on the page, indicating that he should play down on the piano, and would often keep his hand in the same position. He thoroughly enjoyed the physical exercises, although he experienced difficulty with finger exercises, including pressing a washing peg. Tahir had a good understanding of the keyboard topography, identifying black and white notes, playing C-D-E, finger numbers, identifying note values and after six months he could confidently play off-staff pieces.

The parent interview revealed that Tahir was positive, excited and enthusiastic about lessons and the piano homework was found to be effective. Tahir would often repeat words and actions while doing the homework with his mother. It was only towards the end of the six months that he repeated work learned in the piano lesson all by himself. She noticed that he enjoyed the videoclips and would hum the melody while making the moves, and a definite improvement was noticed in Tahir’s ability to respond to questions. Both the parent and teacher interview revealed that he was more responsive and that he could give an answer in two or more short sentences, and the teacher noticed a slight improvement in his receptive language.

There was a change in his emotions and behaviour in class as he seemed calmer, less sad and anxious. He was slightly more mature and had fewer meltdowns. Both the teacher and parent observed that his social skills and communication improved, and more interaction was noticed between Tahir and his classmates, as he would join in during a ball game or call a classmate by name to play with him on the carpet. This had never happened before. Improvement was noticed in his learning abilities and concentration, and Tahir could sit still for a period of 10 to 15 minutes in class and at home when focusing on schoolwork. Both the teacher and mother noted that his ability to respond and listen to instructions had increased.

They also noted an improvement in his fine motor skills (like cutting on a line, control scissors and write neatly) as well as his motor development (being more aware of his surroundings, not bumping into things and his ability to do obstacle courses and physical activities at school).

6.11 ULHAS

Ulhas experienced difficulty in understanding basic music concepts such as the sitting position, his left and right hand, identifying finger numbers, keeping a rounded hand shape, direction, as well as high and low sounds. Gross and fine muscle movements were found to be difficult and he would get discouraged and lose concentration when he could not master an activity, such as playing with individual fingers. He was extremely busy and tended to slight off the chair. Challenges noted in class included communication, lack of concentration and fixation on particular subjects. Language had to be simplified and he would often recall phrases or words he had heard during the day.

Language were simplified and activities broken down in smaller segments. I asked Ulhas to make a fist, playing with one finger at a time to strengthen individual fingers. To develop a feel of a rounded hand shape I asked him to make a fist and gently open and close it. Ulhas experienced difficulty with this action and I noticed a slight improvement in his weekly development. Ulhas would often give the correct answer or play the right note after allocating sufficient time to process the question or information. After six months, Ulhas could confidently recognise his left and right

hand, keep a rounded hand shape and identify finger numbers as well as black-key groups. However, he could not play basic off-staff piano pieces and experienced difficulty in playing with individual fingers on black-keys and in applying his knowledge. I incorporated a break after a 5 to 10-minute piano session. During this time he would hug his mother, run up and down, squeeze a stress ball to strengthen his fingers and gently throw the ball. Homework was found to be beneficial, reinforcing and solidifying music concepts learned. Ulhas thoroughly enjoyed the physical exercises, but could not do the activities smoothly or with good coordination.

According to the parent interview Ulhas thoroughly enjoyed the lessons as well as the piano homework and would often repeat words and actions learned in class. His mother mentioned that he was more interested in music and musical instruments, and both the teacher and parent interview revealed an improvement in confidence and his ability to read basic words. They noticed a change in his emotions and behaviour as he seemed happier, calmer, less anxious, upset and less sad since the start of piano lessons. His mother mentioned that he was patient and more independent and an enhancement was seen in his social skills, communication, learning abilities and concentration. Ulhas was more sociable, making jokes and teasing everyone, and according to the teacher he understood instructions better and could tell the class in three sentences what he did over the weekend. Piano lessons had a positive and calming effect on Ulhas and the teacher indicated that he was now able to sit still in class for more extended periods of time and wanted to complete tasks.

Both the teacher and parent noticed an improvement in his hand coordination, fine motor skills (like his pencil grip and tracing skills) and motor development. According to Ulhas' mother he could bounce a ball with either left or right hand, which he could not do before. However, the teacher wrote that his 'all over (body) coordination is still poor.' They noticed his ability to differentiate between his left and right hand and his mother mentioned that Ulhas had never acknowledged his left hand until he started with piano lessons. In February 2017, there was an adverse change in his behaviour and mood which, according to the physician, could have been triggered by the medication he started using.

6.12 ZOÉ

Aspects she had difficulty with were direction, high and low sounds, left and right hand, as well as muscle control, coordination, gross and fine motor skills, anxiety and communication. Challenging concepts took approximately five weeks to solidify. Zoé's hands would often collapse on the keys, making it difficult to keep a rounded hand shape and to play with firm fingertips. She did not like low or loud sounds and would often cover her ears. Although Zoé did have a general idea about her left and right hand, I made different elastic bands to help her differentiate between her hands. Her reaction towards the elastic bands was positive and she explained: 'Because that helps me by seeing something'.

Zoé would often get anxious if she did not understand a question or when she observed too much visual information. She experienced difficulty in processing more than one thought and would lose concentration when feeling cognitively overwhelmed. I therefore minimised Information or covered the page while teaching a concept and would often ask, "Do you want to give Mom a hug?", giving Zoé the choice to move away from the piano. Physical exercises were incorporated to strengthen both the gross and fine motor skills. Zoé thoroughly enjoyed the activities and I noticed an improvement in her hand position and finger strength after three months of lessons. The physical activities, along with structured lessons, simplified language and visual support, were important to help reduce anxiety. After five months of piano lessons Zoé had a good understanding of the instrument and could play basic off-staff music pieces with minimal support.

The parent interview revealed that Zoé was excited coming to the piano lessons and that she thoroughly enjoyed practising piano at home and would repeat words and hand movement learned in class. According to her mother, learning to play the piano equipped her with another form of stimulation and an outlet when she needed downtime. Playing the piano had a calming effect on her and both the parent and teacher noticed a change in her emotions and behaviour as she seemed happier and less sad, anxious or upset. They also noted an improvement in her social skills, communication, learning abilities, focus and concentration. Zoé's mother mentioned that she would often say, "Leave me; I am focusing", while completing her

homework. She could not do this before and it was a significant improvement compared to the previous year. Zoé was now more creative and would write and play her own music. The teacher mentioned an improvement in her confidence levels and her responsiveness in class. There was an overall improvement in her maturity.

Both the parent and teacher noticed an improvement in Zoé's hand coordination and fine motor skills like colouring in, cutting paper with more control, better pencil grip, improved handwriting, drawing from dot-to-dot, more control over her hand movement, and keeping a rounded hand shape while practising piano at home. Her mother connected the improvement of her fine muscle movement to the piano, as she is required to control individual fingers and an improvement in her motor development was noticed as she walked less on her toes and had better balance. Her mother mentioned that she could use both hands simultaneously, had better posture and that the physical exercises improved her core strength.

6.13 CONCLUSION

The discussion of each participant revealed that learners often had difficulties with particular sections of the teaching material or found it challenging to participate in specific activities due to weak muscle development. I observed similarities among learners, and some learners experienced behavioural problems that often made teaching piano difficult. Parents and teachers noticed an improvement in learners development that I will discuss in the following chapter along with the results of the adapted piano teaching material.

CHAPTER 7: DISCUSSION AND CONCLUSION

The following chapter will discuss the findings of this action research study. The research aim was to find out how music teaching methods could be adapted to help the autistic child to learn to play the piano. The adaptation did not only include changes to the lesson material, but a variety of different aspects had to be considered to create an optimal learning environment. To get a better understanding of the different levels of adaptation necessary, the detailed descriptions of each learner's progress discussed in Chapter 6 will be analysed thematically, giving insight into how piano teaching material could be adapted, which aspects were useful and which I had to change. The emerging themes from the descriptions will be synthesised with the findings of the literature review to incorporate both theory and practice. The results will be viewed from a practical perspective to adapt a systematic method of instruction, equipping piano teachers with the necessary information to teach autistic learners. The limitation and problems that arose during the data collection will be acknowledged and discussed, looking at different avenues that could be explored in future studies.

7.1 OVERVIEW OF THE STUDY

A need for the adaptation of piano teaching methods arose from personal experience as well as from undertaking an elaborate literature review. Time was spent understanding both autism and the comorbidities that often influence the child's behaviour and ability to learn in class. Information about how autistic learners learn in both the music classroom and inclusive classroom was studied and used to change the piano teaching material and environment accordingly, focusing on teaching 12 autistic learners to play the piano.

7.2 DISCUSSION AROUND THE RESEARCH QUESTION

In the course of the piano lessons, an answer to the research question was sought. The aim in mind was to develop useful piano teaching material and methods that could be understood by autistic learners, enabling them to play the piano. Through analysing the detailed descriptions of each participant, questionnaires and

interviews, different themes and sub-themes emerged giving insight on how piano teaching methods can be adapted, the essential changes necessary in the teaching environment, and the importance of the inclusion of physical exercises during teaching.

The adaptations were based on appropriate teaching material, as well as a thorough understanding of autism, comorbidities, insight on the theories explaining cognitive thinking processes and how to create a positive learning environment applying Vygotsky's education theory as mentioned in the literature review. I changed most of the activities before the piano lessons commenced, whereas other activities, such as the physical and finger exercises derived from problems that occurred while teaching. The main themes that crystallised from the data analysis were educational aspects to keep in mind when teaching autistic learners and the positive effect of piano lessons on autistic learners. The sub-themes of each can be presented as follows:

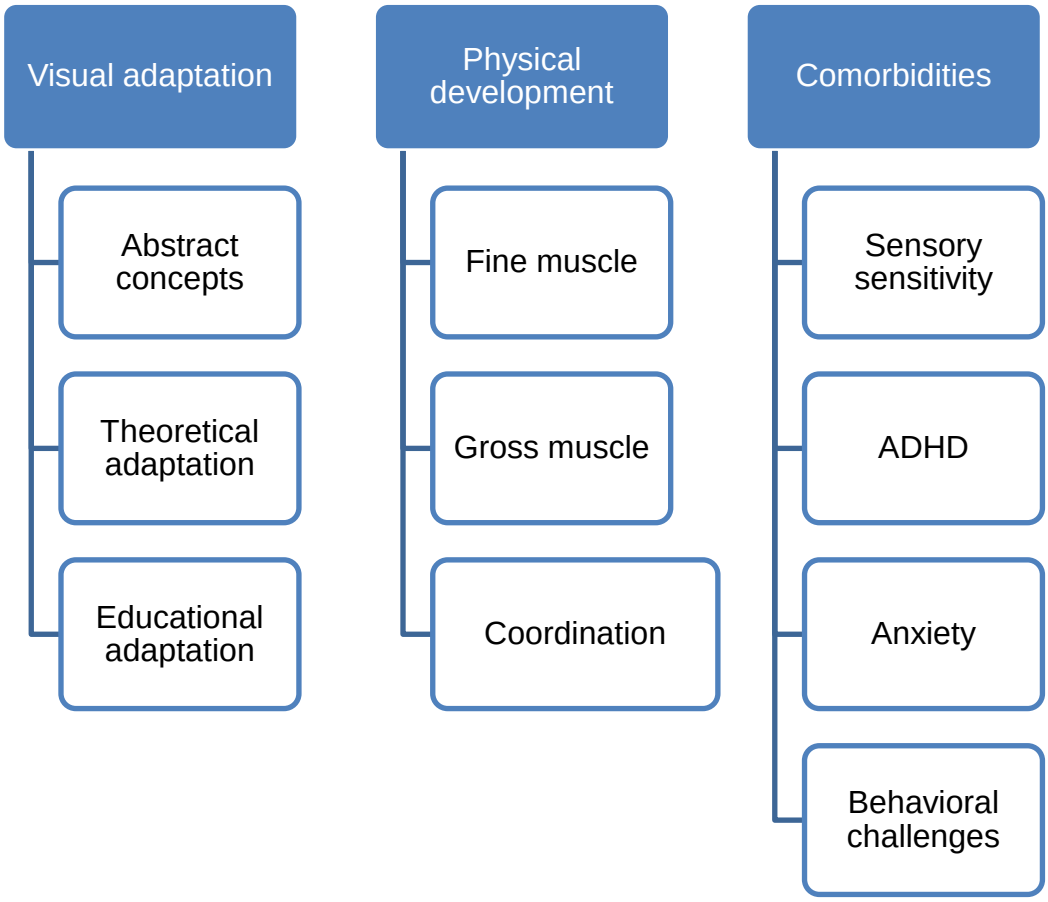

Figure 7.1: Educational aspects

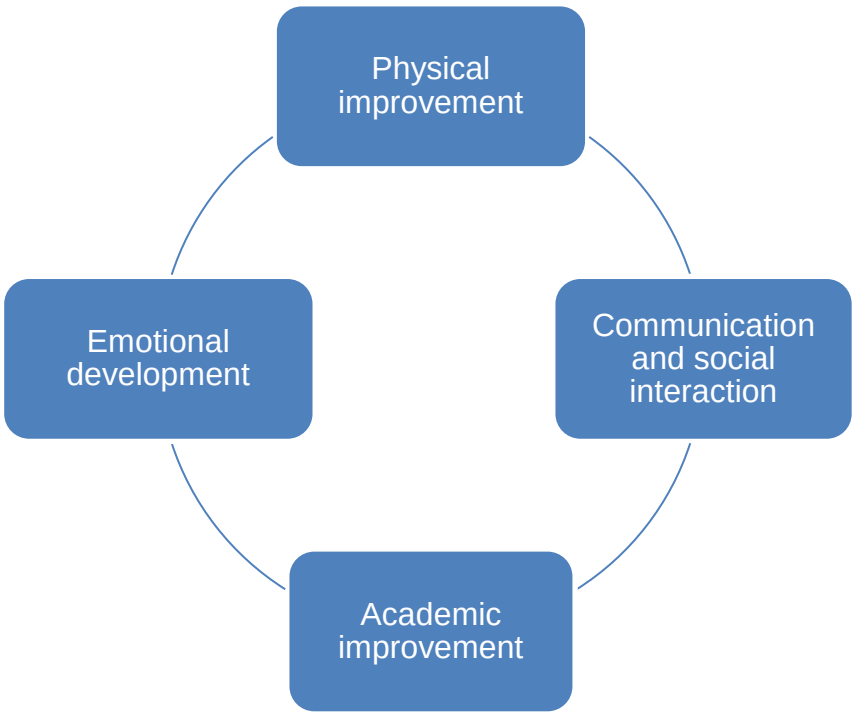

Figure 7.2: Positive effects of piano lessons

7.2.1 Different educational themes to keep in mind while teaching piano to autistic learners

The 12 participants each had unique experiences and difficulties learning to play the piano. I discovered commonalities between their experiences at the instrument that allowed me to identify specific essential issues to keep in mind while teaching the piano to these children. However, one activity could cause different challenges in the children, as one participant may have found the activity too abstract, whereas another participant may have understood what was expected of him or her, but could not do the activity due to weak muscle coordination. Another learner may have found the same music concept challenging to learn due to a comorbidity. The findings will fit my statement in Chapter 2 that children on the spectrum differ from one another and that treatment and management should be individualised.

7.2.1.1 Visual adaptation

The adaptation of the *Piano Adventure Lesson and Writing Book* was found beneficial and helpful. Learners reacted well to the Velcro activities, as suggested by

Hammel (2004), and had a good understanding of the worksheets and activities organised from left to right and top to bottom, advised by Deris and Di Carlo (2013) and TEACCH (2000). However, although I adapted the books before the start of piano lessons, I realised that learners[76] experienced great difficulty in specific areas (See Table 7.1). The repetition of a particular concept often varied between two to seven weeks before learners could apply it with minimal support.

Table 7.1: Visual adaptation issues which influenced learning (n=12)

Visual Adaptation:		**Participants experiencing difficulty**
Sitting position		1
Finger numbers	Difficulty to connect a number to a finger	4
	Difficulty to change the finger number order, sequence of 1-5	2
Abstract concepts		3
Rounded hand shape		2
Direction	Identifying up, down, the same	7
	Connecting descending on the page with down on the piano	1
	Identifying low and high sounds	9
Identifying the left and right hand		5
Ear training		2
Keyboard topography	Understanding C-D-E	1
	Understanding black and white keys	1
	When playing horizontal patterns, tends to 'walk' fingers down or up the keys	1

The sitting position image was not understood (1 of 12)[77] and photographs were used successfully to explain the posture. This finding agrees with Deris and Di Carlo (2013) as well as Garside et al. (2000) explaining that the type of visual information depends on the learner's level of comprehension and can vary from photographs, coloured pictures, line drawings and concrete objects. It is therefore important that the pictorial illustration used in the lesson has to be unambiguous and accurate,

[76] The number of learners experiencing difficulty with an activity is denoted in the right-sided column.
[77] The number of learners experiencing difficulty with an activity will be placed in brackets.

simplifying instruction and clarifying information while using visual prompts, to establish and reinforce music concepts.

Concrete objects and visual illustrations were used to explain abstract music concepts. An example is that the rounded hand shape was taught visually by making a fist and opening it in the correct position, as well as asking learners to see their knuckles. They found direction challenging (7 of 12) and arrow prompts were used, both on the piano and page, to represent up and down. The use of prompts was helpful to teach and reinforce music concepts until the learner was more proficient, being able to do the activity with minimal assistance. The results agree with the findings of other studies (Deris & Di Carlo, 2013), where teachers used prompts and gradually phased it out to encourage independence. Another difficulty (9 of 12) was the low and high sounds, and I related it visually successfully to animal pictures of a frog and a bird. This collaborates with the educational theory of Vygotsky (Karpov, 2014), explaining that it is important to teach from the learner's level of understanding as new learning material has to be based on the learner's existing knowledge.

Ear training was explained visually to learners by asking them to play the pitch direction, as well as the ascending and descending melodies before turning away from the instrument and identifying it by ear. Learners (5 of 12) could not identify their left and right hands and some learners were only familiar with their dominant hand. I made armbands[78] that aided learners in differentiating between their hands and one learner explained, "because that helps me by seeing something''. A learner also found it challenging to comprehend that the hands move sideways on the piano keys and not walking up or down, and a copper crab was used to explain the sideways movement of the hand.

Another learner (1 of 12) could not differentiate if notes were ascending, descending or repeating in a music piece nor in a sight-reading activity. I created an activity

[78] I made armbands out of elastic material and placed it around the learner's wrist. Images were then put on each band to differentiate between the left and right arm (Image in Chapter 5, Unit 5, Figure 5.75).

using a diagram, and the learner was asked to divide notes that are the same or different; different notes then had to be divided into going up or down. From this result it is clear that acknowledging an autistic learner's strength working from detail gradually connecting it to a system of rules to get to an answer (Baron-Cohen et al., 2009) and combining it with Vygotskian theoretical learning approach using a visual chart to guide the learner systematically in problem-solving (Karpov, 2014) were helpful.

The result of the visual adaptation used in the piano lessons is consistent with those of other studies (Stokes et al., 2016; Deris & Di Carlo, 2013; Hammel & Hourigan, 2013; Garside et al., 2000) that found visual support useful to teach students' new concepts as well as minimising anxiety and disruptive behaviour. The visual adaptation was also based on educational theories explaining the cognitive thinking processes of autistic learners as well as Vygotsky's educational theory.

7.2.1.2 Physical development

Playing the piano required not only the visual adaptation of the teaching material but also the learner's ability and physical development to participate in activities that involve both gross and fine muscle movement and strength. Learners encounter hindrances to participate in specific activities, not because of the visual material, but due to weak muscle tone, strength and coordination. I noticed that they experienced problems to control the gross and fine muscle movements that are necessary to play with the correct technique, keeping a good hand position and posture. These difficulties made it challenging for them to participate in easy piano activities (See Table 7.2). Thus, the second theme that emerged from the study was that of Physical Development, which could be divided into three sub-themes, namely fine-muscle movement, gross muscle strength and coordination. These sub-themes often overlapped, as an activity will require different muscle movements to play a particular piano piece or practise a technique.

Table 7.2: Physical development issues which influenced learning (n=12)

Physical development	**Difficulty**	**Participants experiencing difficulty**
Fine Muscle Movement	Keeping a rounded hand shape	9
	Playing with individual fingers	4
	Playing with firm fingertips	2
Gross Muscle Strength	Doing the hand shape activity, and correct hand position	2
	Keeping a good sitting position	4
Coordination	Playing with both hands simultaneously	4

The inability to do finger and hand exercises often caused frustration and learners (2 of 12) got discouraged, anxious and started to lose concentration. This finding corresponds with Garside et al. (2000), who suggest that learners may experience anxiety and levels of frustration if the activity seems too difficult.

Activities requiring fine muscle movement such as keeping a rounded hand shape (9 of 12) were challenging for some learners, and learners (5 of 12) could not control small actions like playing with individual fingers. They would often press the keys down simultaneously instead of separate. Learners (2 of 12) found it troublesome to play with firm fingertips and one learner would curl his fingers inwards. Additional exercises were incorporated into the piano lessons, and an improvement in the learner's fine muscle movement was noticed. The incorporation of physical activities also accords with earlier observations by Lang et al. (2010), Crollick et al. (2006), and Garside et al. (2000), which show that physical exercises and play skills benefited autistic learners.

The underdevelopment of gross muscle strength often made it challenging for learners to do activities that require the use of big-muscle movement such as the sitting position (4 of 12), and participating in the correct movement for the hand-

position activity (2 of 12). The difficulty that learners experienced with the latter activity were simplified using movements familiar to the learners, such as making a fist and gradually progressing to the unfamiliar rounded hand shape. The results agree with the findings of Ingersoll (2007) and Vanvuchelen et al. (2007), in which learners experienced difficulty imitating non-meaningful movements and were more prone to copy meaningful gestures. Weak bilateral coordination made it challenging for learners (4 of 12) to learn essential piano techniques, and learners often experienced difficulty playing hands simultaneously or preferred to play with their dominant hand not recognising the other side (Addendum V). To help learners develop both gross and fine muscle control, I incorporated physical and hand exercises which we did during the break (See Table 7.3).

Table 7.3: Use of physical exercises to improve learning (n=12)

Physical exercises used to:	***Participants***
Improve the fine motor skills • Squeeze a stress ball • Press a washing peg • Pull an elastic band • Make a newspaper ball	8
Improve gross motor skills • Baby and crab crawl • Sit-up • Flying superman • Superman 'hand' soccer	10

Physical activities were incorporated 17 weeks into the piano lessons and had a positive and relaxing influence on them. I noticed that learners participated better in class as they looked forward to doing fun exercises during the break. Choice-making was incorporated, and learners were allowed to decide when they would like to do the activities that had a calming effect on them, as they could take a break when feeling overwhelmed or when they started to lose concentration. This finding corroborates with the idea of Deris and Di Carli (2013), as well as that of Garside et al. (2000), who suggest that opportunities should be created allowing learners to make their own choices that are highly motivational and fosters independence. The

literature also revealed that by adding physical exercises and activities into the learner's program, anxiety, boredom and inappropriate behaviour could be minimised (Garside et al., 2000:34).

An improvement was also noticed in learners' ability to keep a good posture, to play with a rounded hand shape as well as playing with individual fingers. The literature review highlighted the importance to include physical exercises in conjunction with other activities. These exercises were used to strengthen a child's muscles, improve muscle coordination, develop balance and kinaesthetic awareness (Crollick et al., 2006). This is an important finding as my study confirmed that improving motor praxis is essential to learn an activity, which needs well-developed fine-motor coordination. The inclusion of physical exercises in the piano lessons was helpful in improving learners' muscle tone to do a sequence of hand movements that is necessary to perform a piano piece with fluency.

Most learners (9 of 12) thoroughly enjoyed the activities, however one learner did not enjoy workouts during the lessons, and we did it before the lessons. Teaching material should therefore not only be adapted visually to support the learner but also physical by including exercises that develops the muscle strength necessary to play a music piece. The results indicated that the piano lessons were more productive when sensory sensitivity, ADHD, behavioural challenges and anxiety were taken into consideration. Physical exercises were incorporated, not only to strengthen weak muscle strength, coordination and control but also to help with behavioural challenges and sensory sensitivity that occurred during the lessons.

7.2.1.3 Comorbidities

The third theme that emerged from the data analyses was the effect of comorbidities. Comorbidities often made it challenging to teach the piano as learners would lose concentration got upset and reacted to the discomfort caused by the comorbidity. The overlapping of autism with other psychiatric disorders often complicates the child's behaviour in class and it is therefore important to give attention to both the comorbidity and autism (Hayashida et al., 2010). Teaching piano required additional support and adaptation to accommodate each learner's need and deal with the

different comorbidities that often interrupted the lessons (See Table 7.4). Comorbidities could be divided into four sub-themes, namely sensory sensitivity, ADHD, anxiety and behavioural challenges. I noticed that it is important to acknowledge the comorbidity before continuing with new teaching material.

Table 7.4: Comorbidities influencing learning (n=12)

Comorbidities influencing the piano lessons	**Participants who experienced difficulty**
Sensory Sensitivity • Proprioception • Auditory	3
ADHD • Concentration • Busy/Restless	5
Anxiety (not Anxiety disorder) • Inability to do an activity • Not understanding the work • Cognitive overload	6
Behavioural challenges • Getting upset • Emotional • Rapid hand movements	4

Sensory sensitivity such as proprioception and auditory hypersensitivity often influenced the piano lessons, and learners (3 of 12) tended to focus first on the sensitivity that causes discomfort or even pain before concentrating on the teaching work presented in class. This finding agrees with that of Howe and Stagg (2016), who show that learners often find it difficult to concentrate in the lesson as their primary focus is on the sensory stimuli disturbance and not on the work presented in class. Learners (2 of 12) could not keep a good body posture due to proprioception,[79] and their bodies would often collapse or slouch in the chair, whereas another learner (1 of 12) experienced difficulty with auditory sensitivity. The result ties in with a previous study, showing that sensory sensitivity can even cause

[79] Proprioception refers to sensory messages about the position, force, direction and movement of the body parts that help us to walk smoothly, sit or stand (Kranowitz, 2006:87).

physical discomfort at the time and it may affect the learner's ability to learn new skills, including a reduction in concentration, and learners being anxious (Howe & Stagg, 2016).

Attention-Deficit/Hyperactivity Disorder (ADHD) often made teaching the piano difficult as the learner seemed unengaged and would not immediately participate in an activity. Learners (2 of 12) lost concentration fast and found it difficult to focus and to sit still, while some would often be 'busy' at the piano, sliding off the piano chair, being fidgety, getting restless or getting up, and not being entirely involved in the lesson. This finding agrees with Romeo et al.'s (2016) results showing that ADHD often coexists with autism, creating distinct characteristics such as poor focus, adaptive social problems, academic dysfunctionality and difficulty following routine. Learners did not only find it difficult to concentrate because of ADHD, but often got overwhelmed and lost focus due to anxiety or even sensory sensitivity.

High levels of anxiety were evident in learners (6 of 12) during the piano lessons and were caused by various aspects such as the inability to do an activity, not understanding the work or cognitive overload. The difficulty that was experienced to do specific movements and music activities caused a feeling of nervousness by learners (5 of 12). These observations seem to be consistent with those of Willis (2009) suggesting that autistic learners often experience anxiety, which can lead to a meltdown when they encounter an overload of information.

I also noticed that the difficulty learners (2 of 12) experienced to do finger exercises or to play a music piece often caused high levels of frustration. This finding supports previous research into learners' inability to participate in activities due to motor planning, a skill that is necessary when learning to play the piano (Hammel & Hourigan, 2013). I noticed that learners often understood what was expected of them but could not do the activities. As part of anxiety issues, learners would start stimming, making rapid hand movements or making sounds while flicking their fingers. This often helps them to calm down and agrees with Hammel and Hourigan (2013), who found that the flapping of hands has a calming effect on the learner's sensory-motor system and should be taken into consideration during lessons.

Learners (3 of 12) could not apply two or more music concepts, and one learner was anxious explaining that too much information made her scared (Addenda V). This finding is consistent with those of Garside et al. (2000), who found that learners might experience anxiety and feelings of frustration if an activity seems too difficult. To minimise tension and to build their confidence I created a *Steps to read music* plan supported with pictures to guide learners to play a new piece. This is in agreement with literature explaining that learners should be prepared in advance for a class activity using images in sequential order to familiarise learners with the schedule (Deris & Di Carlo, 2013; Harrower & Dunlap, 2001; Willis, 2009) and that complex tasks should be taught in small segments and reinforced in order until the learner is confident with the activity (Garside et al., 2000). The visual illustration of *Steps to read music* was found helpful as learners could see what is expected of them and gradually add information necessary to play an entire off-staff piece. The precise work structure had a calming effect on learners and is in accord with Deris and Di Carlo (2013), who found that a well-organised workspace minimises stress levels and helps learners to focus and concentrate better.

Individuals reacted differently to cognitive overload, and I noticed the following, namely excessive talking (1 of 12), getting emotional or upset (1 of 12), and starting to lose concentration (6 of 12). The last mentioned lead to more behavioural challenges such as learners walking away from the piano or getting restless (2 of 12), refusing to continue with a lesson (1 of 12), starting to play piano pieces by ear (1 of 12) or identifying colours in the book or environment (1 of 12). In an attempt to counteract cognitive overload, breaks were incorporated and piano lessons were divided into two sessions of 10 to 15 minutes each. Some learners (2 of 12) concentrated better if lessons were even shorter (approximately 5 to 10 minutes), with a break and another 5 to 10-minute lesson. I noticed that the shorter piano lesson duration and physical exercise breaks worked effectively for learners as they could concentrate for longer periods and were less fidgety.

As mentioned in the literature review, individuals diagnosed with autism are often inflexible in specific patterns, and stereotyped interest and activities can manifest in different ways (APA, 2000, 1994). The behaviour also accords with the results, which showed that learners (2 of 12) refused to change the finger number order 1, 2, 3, 4, 5

or 5, 4, 3, 2, 1 at first, and only one of the two learners started to change the sequence after continuous reinforcement. The reluctance to change the finger order might have been because of the insistence of sameness found in children with autism. During the piano lessons, I noticed that learners (9 of 12) often experienced difficulty with communication. This is in line with Scott's (2014) findings that verbal instruction can be daunting. Learners found it difficult to understand verbal instruction (5 of 12) as well as to answer questions verbally (4 of 12), and preferred to point to prompts (2 of 12) or tried to speak by making self-created sounds (2 of 12). The results match those observed in earlier studies by Darrow (2009) and Hammel (2004) emphasising the use of pictorial instruction, images and a word bank supporting terminology in class to enhance responses.

Different behavioural challenges arose during the piano lesson, often interrupting the teaching environment, or even made it impossible to teach as learners (3 of 12) refused to continue with the lesson. The reason for the behaviour varied between individuals. It could be, for example, due to something that happened during the day, verbal comments understood literally, or continuing with the lessons after the break. Their needs were taken into consideration and I made time to listen to the reasons given and tried to act accordingly.

7.2.2 The positive effect of piano lessons on autistic learners

Interviews and questionnaires completed by parents and teachers were analysed, and different themes emerged from the responses. Although the primary focus was to adapt music teaching material to teach autistic learners how to pay the piano, additional information appeared, evidencing that the lessons influenced various areas of the learners' lives. Not only were the learners equipped with basic piano knowledge, but also with new skills that had a positive effect on their day-to-day life. The different themes that emerged from this part of the data collection are physical development; communication and social interaction; academic improvement; and emotional development.

7.2.2.1 Physical improvement

It was clear that learning to play the piano had a positive effect on learners' physical improvement. Parents and teachers noticed positive changes in learners' ability to use gross and fine motor skills; bilateral coordination; muscle strength as well as the ability to do physical activities (See Table 7.5).

Table 7.5: Positive effect on physical development (n=12)

Improvement in physical development	**Participants who showed improvement**
Bilateral hand coordination	10
Fine motor skills	10
Gross motor skills	11
Motor planning improvement	1
Muscle and finger strength	1
Crossing the midline	1

Improvement were also noticed in other areas of learners' development (10 of 12), including ceasing to or walking less on tippy toes (2 of 12), improvements in running (1 of 12), climbing (2 of 12), catching a ball (2 of 12), being less clumsy (1 of 12), enjoying dancing and singing (1 of 12), and having better balance and an improved posture (2 f 12).

The development of fine-motor skills was not only noticeable in piano lessons where children started to play with individual fingers, but it translated into different areas of the learners' development and doing everyday tasks like neater writing (7 of 12), better cutting skills (4 of 12), colouring (3 of 12), improved pencil grip (5 of 12) and tracing skills (1 of 12), as well as better finger and hand control (2 of 12). The improvement of muscle skills was also evident in play and daily activities such as handling tiny objects like playing with small Lego blocks (1 of 12), sharpening a pencil (1 of 12), using a key to open a door (1 of 12), and one learner was now able to tie her hair (1 of 12).

Piano lessons equipped learners with the ability to develop the finger independence and strength that are necessary for school and daily activities, and respondents observed a change in learners' ability to work with fine objects at home and in the

school environment. Although little information was found in the literature on the effect of piano lessons on learners' physical development, data were discovered on the implementation of physical activities, and how it strengthened learners' muscle tone, develop balance and improve coordination (Crollick et al., 2006), as well as how physical exercises maintain an effective lifestyle (Geslak, 2016). From these results it is clear that learning to play the piano has similar effects as physical exercises that help to develop stronger muscle strength and coordination to do daily activities.

Learners' bilateral coordination (10 of 12) improved and they were able to use both hands simultaneously (3 of 12), for example, a learner (1 of 12) was able to cut a cucumber or tomato holding it with one hand while cutting with the opposite hand; and learners (3 of 12) could differentiate between their left and right hand, which they could not do prior to piano lessons. Respondents also noticed an improvement in a learner's (1 of 12) ability crossing the midline and a learner's (1 of 12) motor planning enhanced.

My study demonstrated that the inclusion of music intervention as well as music as a therapeutic intervention increased body awareness and improved coordination in children diagnosed with autism confirming findings of the literature review (Whipple, 2004). Learning to play the piano taught learners' important muscle movements and improved hand coordination, which had an effect on their daily activities as they were expected to play notes simultaneously with both hands, or to alternate between hands.

7.2.2.2 Communication and social interaction

From the interviews and questionnaires it was apparent that piano lessons had a positive effect on learners' ability to communicate and to be more social among peers. They were more willing to talk and interact (See Table 7.6).

Table 7.6: Positive effects of piano lessons on communication and social interaction (n=12)

Communication and social interaction		**Participants that showed improvement**
Language improvement	Comprehension	1
	Receptive language	2
	Expressive language	4
More vocal and communicative		6
Social skills		7
Responsiveness (Communication)		4

As mentioned in the literature review (APA, 1994; APA, 2013), expressive language (vocabulary) and receptive language (language comprehension) are often considered separate in individuals diagnosed with autism as they may communicate but lack understanding. From the interviews it was apparent that learners' comprehension (1 of 12), receptive (2 of 12), and expressive language (4 of 12) improved. My finding agrees with those of De Vries et al. (2015) and Whipple (2004), which revealed that integrating music activities and listening to music into a classroom helps to improve autistic learners' social behaviour and increase both communication reciprocity and vocabulary comprehension. Learning to play the piano had similar benefits for learners diagnosed with autism and a mother mentioned that both she and the learner's speech therapist were observing an improvement in his speech as he tried to communicate regularly and made more sounds.

Learners (6 of 12) started to be more vocal and communicative, whereas some learners (4 of 12) were more responsive than before. From the interviews it was apparent that learners' social skills (9 of 12) and interaction between classmates (1 of 12) improved. These results match those observed in earlier studies by Hillier et al. (2011), which found that learners showed a positive attitude towards peers and relationships after completing a music program. The inclusion of piano lessons thus not only develops music skills to play the instrument, but also develops important social skills.

7.2.2.3 Academic improvement

The third theme that emerged from the study was academic improvement (See Table 7.7) and an enhancement was noticed in learners' performance in schoolwork.

Table 7.7: The impact of piano lessons on academic improvement (n=12)

Academic improvement	**Participants who showed improvement**
Learning ability	9
Reading skills and reading ability	4
More endurance, perseverance, and patience	7
Problem solving skills	1
Concentration and focus improved	10
Better attention	1
Listen attentively to instructions	3
Memory	1
School homework	4

Parents and teachers observed an enhancement in learners' learning ability (9 of 12) reading skills (4 of 12), spelling capabilities (1 of 12) and logical thinking (1 of 12). Learners (7 of 12) were prepared to try mastering more difficult work or new activities without giving up and an improvement was noticed regarding their endurance, perseverance and patience.

An increase was noticed in learners' (10 of 12) ability to concentrate and focus for longer periods of time. It is encouraging to compare this finding with that of Whipple (2004), who found an increase in attention to tasks and reduction in anxiety when music is incorporated in an activity. Learners (4 of 12) reacted better to homework and classwork and one learner would complete tasks without getting distressed, whereas other learners would work more independently and complete their work. Progress was noticed in learners' ability to listen attentively to instructions (3 of 12) and one learner showed an enhancement in attention and memory, whereas another learner was more creative in writing and playing basic music pieces.

7.2.2.4 Emotional development

From the interviews and questionnaires, it was apparent that piano lessons had a positive effect on learners' emotions (See Table 7.8).

Table 7.8: The impact of piano lessons on a learner's emotions (n=12)

Emotional Improvement:		**Participants who showed improvement**
Calmer		12
Happier		6
More affectionate		1
More relaxed		2
Piano lessons therapeutic		1
Less	Sad	10
	Anxious	9
	Upset	8
Endurance, perseverance, patience		6
Respectful and obedience		1
More resilient		1
Confidence		6
More mature		3
Learning ability improved		10
Concentration, focused improved		11
Ability to sit still		7
Fewer meltdowns		1

Parents noticed that learners (12 of 12) were calmer after starting with piano lessons. However, the time that it took varied between learners; some were calmer after two months (1 of 12), or five to six months (1 of 12) and one learner (1 of 12) was only relaxed during the lesson. These results match those observed by Allen et al. (2009) in an earlier study that found listening to music helped individuals on the spectrum to counter anxiety/tension and create a sense of relaxation/calmness. From the interviews it was apparent that learning to play the piano had a calming effect on learners (11 of 12), and respondents explained that playing the piano was therapeutic, giving learners an outlet. However, one parent was not sure if it was the result of the piano lessons or medication.

Learners (6 of 12) were happier and one teacher excitedly claimed that “the learner tries and does not easily get upset”. Both teachers and parents noted that learners were less sad (10 of 12), anxious (9 of 12) and upset (8 of 12). This finding also accords with earlier observations by Finnegan and Starr (2010), who found that children seemed happier, smiled more often and laughed appropriately with the inclusion of music in play activities. It was apparent that learners (6 of 12) were more confident and could do activities independently. One learner (1 of 12) started to ask for help instead of getting emotional, whereas playing the piano with confidence and competence permeated all aspects of another learner’s (1 of 12) life. These results agree with the findings of a study by Hillier et al. (2011), in which the use of music and technology had a positive psychological outcome and learners showed lower levels of anxiety and higher levels of self-esteem. Respondents observed that learners (3 of 12) seemed more mature and one learner reacted better to correction. However, it was not certain if the increase in maturity was due to piano lessons or age. From the interviews and questionnaires it was apparent that learners (7 of 12) could sit still for longer periods while completing tasks or school homework. A respondent mentioned that a learner ceased to walk up and down the school corridors, whereas another respondent noticed that a learner could sit still in class for a period of 10 to 15 minutes.

7.2.3 Overall findings of the themes

The results found that not all autistic children have a natural ability to play the piano by ear. Only 1 of the 12 learners could play pieces heard in church or on the radio, whereas 11 of the 12 learners needed guidance to learn to play the piano, of which 2 of the 12 learners could not get past Unit 3. The results showed that 10 of the 12 learners could play easy piano pieces with minimal assistance after six months of piano lessons. Basic piano lessons are therefore necessary to help learners understand the instrument, to teach them to be interdependent at the piano and to play music with minimal prompting while building confidence at the piano. My findings demonstrate that autistic learners could learn to play the piano with the correct visual and theoretical educational adaptation of teaching material. The inclusion of physical exercises was beneficial as it allowed learners to move away

from the keyboard where they had to process new information and to enable them to participate in self-regulation that has a calming effect on the individual.

7.3 RECOMMENDATIONS

The learners' diagnosis and individual needs have to be taken into consideration, making sure that optimal energy can go into the piano lesson, rather than the learner trying to 'cope' with a class that is too long, having an environment that is too distractive, and experiencing comorbidities such as sensory sensitivity that can cause anxiety or even pain. Learners often feel overwhelmed when they do not understand the material or are unable to do a physical movement. Three different areas of interest will be discussed to guide teachers interested in teaching the piano to autistic learners. These are the adaptation of lesson books, recommended ideas for the piano teacher and recommended adaptations of the environment.

7.3.1 Adaptation of lesson books

Children diagnosed with autism are primarily visual learners and often experience difficulty to understand receptive language. The piano teaching material should, therefore, be visually adapted and oral instructions simplified. Detail such as colours or too many images can distract a learner, and essential piano pieces or worksheets should be simplified, focusing on one new music concept at a time. The next musical idea should be gradually introduced after sufficient time has been allocated to reinforce and solidify the new work, allowing the learner to be confident with the concept. Continuous reinforcement, supported by visual images and explicit language should be used, minimising an overload of cognitive information, thus giving the learner the time to process essential concepts.

Abstract information such as high and low, or loud and soft sounds could be explained by using concrete objects, for example, plastic animal toys or visual prompts. Laminated card prompts are useful, as learners can use it to give the correct answer, minimising anxiety as they might find it difficult to pronounce the word or remember the terminology. These cards can easily be moved around or placed on the laminated page using Velcro strips.

When adapting the lesson book, it is especially important to ascertain which music concept the unit or page focuses on and to keep the overload of visual as well as abstract information to a minimum. One must keep physical movement in mind when adapting the work. Although the units might visually be correctly adapted to accommodate the individual learner's need, the physical difficulty to do the activity can lead to anxiety or frustration as the learner's bilateral coordination, fine and gross motor skills as well as muscle strength may not be well developed. Physical activities should, therefore, be combined in the lessons to develop muscle strength.

Suggestions for adapting music books are as follows:

- Visual adaptation of piano work, such as the simplification[80] of music pieces, using concrete objects and pictures to illustrate concepts.
- Simplify information focusing on one concept.
- Laminate visual prompts, images, pictures that represent music concepts and use it one at a time.
- Make prompts of the symbols and words taught in the piano book.
- Use Velcro-strips to place prompts on a laminated page.
- Work from concrete concepts to abstract information.
- Work from left to right and top to bottom.
- Minimise and simplify verbal information regarding the specific lesson.

7.3.2 Important concepts for the piano teacher to keep in mind.

Teaching the piano to children diagnosed with autism not only requires the teacher to have a good understanding of the instrument and teaching material, but also of the strength and weaknesses of the neurodevelopmental disorder autism. It is crucial to understand the comorbidities, which allows the teacher to adapt to the environment and aspects of the lesson for maximum assimilation of knowledge and skills. Teachers should first address the comorbidity that causes the learner to focus

[80] The simplification of music pieces refers to the written finger numbers or notes that can be replaced by images of the black or white keys to show which keys the learner should play. Information of music pieces can be minimised, eliminating additional details such as colour, words or pictures that might be too much for autistic individuals.

on something else instead of the piano lesson. Learners would often be diagnosed with both autism and ADHD; last mentioned may cause learners to get restless, fidget and lose concentration.

Sensory sensitivity also influences the piano lessons, and learners would experience difficulty sitting still due to physical discomfort, or cover their ears because of auditory sensitivity. To minimise discomfort and pain and creating a feeling of being in control, teachers should allow learners to make their own choices regarding the amount of work they can complete. Physical exercises can be introduced to develop both gross and fine muscle skills, as well as creating a time slot for self-regulation and stimulation that have a calming effect on the learners.

Understanding the learning strengths of children diagnosed with autism is crucial, as it enables the teacher to create a learning environment that is beneficial for them. Autistic learners focus primarily on small units and experience difficulty in putting concepts together to create a whole. Learners would often get anxious if they have to apply two or more ideas and it is therefore essential to guide the learner step by step to work from the detailed music information gradually, building it up to play a basic piano piece.

Suggestions for the piano teacher to remember are as follows:

- Piano teachers should understand the neurodevelopmental disorder as well as the comorbidities.
- Be informed about the learner's diagnoses and comorbidities.
- It is recommended that parents are part of the lessons as they know their child's behaviour best and can often give advice on how you should approach the child, or what change is required in teaching.
- Comorbidities should be addressed by first minimising anxiety.
- Lesson times should be divided into 10 to 15-minute sessions with a break in-between, reducing an overload of information and anxiety.
- Incorporate physical exercises allowing self-regulation and building muscle strength. It can include activities like crawling, sit-ups, crab-crawl, flying-super-man.

- Finger exercises can be integrated into the lesson by pressing a stress ball or washing peg.
- To emphasise the left and right hand, teachers can gently throw the stress ball to learners and ask them to catch it with a specific hand.
- Taking turns to talk during the lesson, “my turn”, and “your turn” is also recommended.
- Continuous reinforcement and repetition are necessary for the learner to understand the work.
- Teach piano techniques making use of gestures familiar to the child and gradually work from the known to the unknown.
- Add physical exercises to develop muscle strength as well as fine and gross muscle control.

7.3.3 Recommended adaptations of the environment

An appropriate teaching environment is essential, as learners with autism often experience a sensory overload or meltdown if too many patterns, colours or textures are used. It is therefore vital to remove colourful items or cover them with neutral material. Auditory stimuli should be taken into consideration, as learners are often sensitive to loud noises and may be scared or even experience pain. Some learners may be sensitive to light, and it is important to make sure that no flashes or rapid lights are used during the lesson. A cool-down room should be used allowing the parent and learner reprieve from the learning environment if it causes an overload. The room may also act as a safe zone if a learner experiences a meltdown and valuable items such as electronic systems or office equipment should be removed.

Points to consider regarding the environment when teaching an autistic learner are the following:

- Be informed about the learner’s sensory sensitivity.
- Adjust the environment according to the learner’s needs.
- Use neutral colours, minimising too many patterns, colours or textures.
- If there is a rug in the studio, cover it with a neutral colour bed sheet to reduce tactile sensitivity or visual overload.

- Organise the teaching environment that it is structured and easy to move around.
- Do not make changes to the teaching environment, such as moving furniture between lessons, as it may cause anxiety and prevent an optimal learning experience.

7.4 METHODOLOGY ISSUES AND LIMITATIONS OF THE STUDY

Both methodology and limitation issues arose in this study. Firstly, the problems experienced in the data collection had been discussed and secondly the limitations to this study. For the reasons mentioned in the methodology chapter, stratified purposeful sampling was used. Although this choice allowed for in-depth, rich and detailed information, the results cannot be generalised to all individuals on the spectrum. An important issue in research groups with a small sample size is the fact that children may have both a wide age range and widely differing abilities, which affect the generalisation of findings.

In this study, the sample size of 12 participants was found too big for the particular study, and smaller size of 8 or 10 participants might have been better. The rationalisation behind the decision to involve 12 participants was that some of them might withdraw. However, no participant stopped lessons, and an extensive amount of time was spent collecting data. The sample size of 12 participants ensured for more in-depth and valuable information. In retrospect, a transcriber could have been asked to complete the transcriptions, as the writing of the transcripts was time consuming, and additional time had to be added to the research. Limitations were noticed in the selection criteria, as the basic requirements were the child's age and medical diagnoses. It would have also been better to include having a piano at home as well.

Problems arose during the study regarding the three-month interviews and questionnaires. Piano lessons commenced in the third term and continued into the new academic year. It was challenging to get hold of teachers at the end of the academic year to complete the three-month questionnaires and to conduct interviews. Therefore, the three-month surveys were given to class teachers at the

start of the first term, and interviews were primarily conducted at the end of the six months. However, the limitation of the three-month interviews did not influence the data analysis or findings, as the information at the end of study six-month interviews is of importance.

Limitations of this study emerged while scheduling interviews with potential participants. Teachers interested in teaching autistic learners should inquire in advance from parents if the child has an obsession or fixation on a specific item or object, for example, a swimming pool or animals. Learners might climb over a wall to get to the purpose of obsession and being informed in advance allows the teacher to get additional safety measurements in place. It is also vital to address sensory sensitivity such as auditory stimuli immediately, as learners' may refuse to continue with a piano lesson if they experienced any form of discomfort.

I scheduled 30-minute piano lessons in a 40-minute time slot. However, I found that allocating 10 minutes for arrival, settling and leaving was not enough, as lessons often overlap due to learner's emotional behaviour or circumstances such as bad weather or traffic that caused parents to run late. It will therefore be advisable to allocate a 60-minute timeslot per participant, allowing more time for unforeseen situations. Another limitation that occurred was that no information is available on what type of physical exercises could be used in the piano lesson environment to teach and benefit the autistic learner.

7.5 RESEARCH POSSIBILITIES FOR FUTURE STUDIES

After my experience of teaching autistic children, it became apparent that more studies should be conducted on specific physical and finger exercises necessary to play the piano. I found that learners got frustrated if they could not do particular activities required to perform a piece or a technique. Future studies may explore specific activities connecting it to particular piano techniques and concepts to evaluate adapting piano lessons for the autistic learner. Incorporating physical exercises into a piano lesson can enhance the learner's ability to participate in music activities and minimise frustration. These aspects can be explored by evaluating specific exercises and testing effectiveness in and between subjects.

Future studies should explore using a more significant number of participants, which will allow the results to be generalised. In a small study it is not possible to stratify learners according to endophenotypes, for example, children with severe intellectual disabilities versus children with average intelligence. Studies assessing the subgroups of children or groups with specific comorbidities should be useful. The next steps would be to take different methods that have been developed and compare them in groups of children utilising quantitative methods and a blinded outcome design.

7.6 CONCLUSION

During the study, I identified themes proposed in the literature in the 12 participants. These themes included both the strengths and weaknesses of autism and the action research method, combined with reflection, enabled me to adapt teaching methods to achieve success. The level of achievement varied, as can be expected in a small sample of learners with a significant age difference and different abilities, but all the children demonstrated some positive progress. With sufficient visual support, simplification of work material, multiple modes of communication and a predictable piano routine as well as continuous support, it was possible to teach autistic learners to play the piano. I observed that learners experienced great difficulty with muscle strength and bilateral coordination, as well as fine and gross motor control. I incorporated physical exercises and finger exercises into the lessons to develop muscle strength and allow for self-regulation. I noticed that the majority of the learners enjoyed the activities.

The adaptation of music teaching methods was helpful and practical, as learners could play easy piano pieces with minimal support. However, piano lessons were found more productive with the inclusion of physical exercises, as it did not only develop and strengthen muscle control, but had a calming effect on learners by, amongst others, allowing time for self-stimulation. The lessons created a learning environment in which socialisation between teacher and learner was encouraged while teaching the piano and allowing learners to interact on their level of communication.

In the past few years, interventions in children with autism have moved away from historical and often rigid approaches to a more natural method of learning. These approaches share standard features using principles from both traditional interventions and the underlying forces of child development, which are then combined with the idea that normal development should drive the learning process. The dual contribution and integration of the different approaches are referred to as Naturalistic Developmental Behavioural Intervention (NDBI) (Schreibman, Dawson, Stahmer, Landa, Rogers, McGee, Kasari, Ingersoll, Kaiser, Bruinsma, McNerney, Wetherby & Halladay, 2015:2411-2412) that is applied in a child's everyday life. Skills are taught in a natural environment and integrated across domains to prevent learning from becoming context bound or prompt dependent. The key concept is that all learning is enhanced if learning occurs during meaningful social, effective interactions. Teaching is often initiated by the child and occurs during child-preferred activities using materials the child finds motivating.

In conclusion, it can be said that teaching autistic learners to play the piano in a natural classroom environment is related to naturalistic intervention programs that are used to strengthen the child's motivation. These programs can be delivered by both parent and therapist, allowing the parent to continue with the program or learning subject at home, allowing for more natural learning experiences emphasising 'socialisation' between child and parent, or child and therapist. The teaching process starts by securing the attention of the child, being sensitive to the child's level of arousal, optimising motivation and offering multiple opportunities for communication. The process should be fun driven with engagement trying to "find the social smile". The language used should be at the child's level, with the principle of using one word more than he/she (one-up expansion). This natural developmental approach fits well with my action research model, and it is clear that many of my adaptations follow the underlying theory of this model. It may well be that music teaching and exposure should be an integral part of developmental interventions.

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LIST OF ADDENDA

ADDENDUM A: INVITATION E-MAIL

To Whom It May Concern:

Hope you are well.

I am currently enrolled in a Master's degree focusing on "Adapting piano teaching methods for children diagnosed with autism spectrum disorder."

For the purpose of this study I am focussing on ten autistic students who show an interest in music or whose parents would like them to learn to play the piano. The study will take place at my studio in Glenwood, Berea. If possible I would appreciate it if you could refer me to parents, who might be interested, or tell them about the study. I have attached an information form about the study, which you can give to parents and guardians that might be interested. Participants are welcome to withdraw from the research at any point in time.

The research is about teaching children diagnosed with Autism Spectrum Disorder to play piano. The proposed study is qualitative in nature and private piano lessons will be given to the ten students. Thirty minute piano lessons will be given on a weekly basis, at the same time, for a period of six months. Parents/ guardians will be asked to sit in during the lessons.

My hypothesis is that the transformation of pedagogy methods may equip the autistic student to learn to play piano. By adapting piano method books and combining these with teaching methods appropriate for autistic children, effective piano teaching material and methods can be developed that will be better understood by autistic students.

The criteria for participants is that children must be diagnosed with Autism on the DSM-IV as 'Asperger Syndrome, High-Functioning, Pervasive Developmental Disorder not Otherwise Specified (PDD-NOS)' or DSM-V on 'Level 1 and Level 2'. In the new DSM-V, participants on Level 1 *require support* (without support in place, deficits in social communication cause noticeable impairments; difficulty initiating social interactions and a-typical or unsuccessful responses to social overtures of others. Inflexibility causes significant interference with functioning in one or more contexts.)

Participants on Level 2 *require substantial support.* (Marked deficits in verbal and nonverbal social communication; social impairments apparent even with supports in place; limited imitation of social interactions. Inflexibility of behaviour; difficulty in coping with change or other restricted of repetitive behaviours appears frequently and interferes with functioning.)

For the purpose of this study it is important for individuals to be diagnosed by a specialised health practitioner who specialises in Autism (Paediatric Neurologist; Psychologist), otherwise is may be argued that the study is of no effect and the Master's will not be recognised by the University. For this study the biological age of the children will be from 6 to 12 years of age.

Thank you so much for your assistance and I am looking forward to hearing from you.

If you have any enquiries please contact me.

Warm Regards

Nadia

076 205 7256

ADDENDUM B: POTENTIAL PARTICIPANT'S INFORMATION LETTER

Piano lessons for children diagnosed with Autism Spectrum Disorder

I am a Masters' degree student enrolled at the University of the Free State and am doing research on teaching children, who have been diagnosed with Autism Spectrum Disorder, to play the piano by adapting piano teaching methods using an approach that will be better understood by autistic students.

Thirty minute piano lessons will be given on a weekly basis for a period of six months, with no cost involved for children participating in the research. A possible advantage to the participants will be the opportunity to learn to play piano and develop new motor skills.

Parents will be asked to sit in during lessons. Students may be asked to do piano homework during the course of the week, though this will not be a lot. One assignment may be given for the week, which should be done on a daily basis. Homework will primarily focus on reinforcing a technique or music concept learnt in class and should prepare the student for the next lesson for example, students may be asked to watch a video clip about a technique the researcher did in class.

As a qualified music teacher I have been teaching piano since 2011 and for the past two years I have been teaching a child that has been diagnosed with Autism Spectrum Disorder.

For the duration of the six months both my supervisors, Dr. David Griessel, a Senior Lecturer and Principle Specialist in Paediatrics and Child Health, and Dr. Frellet De Villiers, Lecturer at Odeion School of Music, will be supervising the study. Dr. Griessel and Dr. de Villiers will oversee the methods that will be used during the piano lessons.

The lessons will take place at my studio in Glenwood, Durban. If you would like your child to participate, please contact me, Nadia Nell (researcher) at mobile number 076 205 7256 or e-mail nadia@pianostudio.co.za.

ADDENDUM C: PARENT CONSENT

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Bloemfontein
9300

T: +27(0)51 405 3181
M: +27(0)72 601 9158

griesseldj@ufs.ac.za

PARENTAL CONSENT: DATE: 1 AUGUST 2016

Dear Parent

I would like to invite you to take part in the following research project:

ADAPTING PIANO TEACHING METHODS FOR CHILDREN DIAGNOSED WITH AUTISM SPECTRUM DISORDER

This study is about teaching children, who have been diagnosed with Autism Spectrum Disorder, to play piano by adapting piano teaching methods using an approach that is better understood by autistic students.

I would like you to participate in this research, as music education specifically in the field of adapting piano teaching methods for children diagnosed with Autism Spectrum Disorder, has not been done yet. Students will be given thirty minute piano lessons at a specific time, on a weekly basis, for a period of six months. The piano material that will be used is “My First Piano Adventure for the Young Beginner, Pre-Reading” (2006) by Nancy and Randall Farber. Additional material such as games, visual aids, video modelling, prompting and adapting communication skills (sign language, hand gestures) that are based on suggestions taken from literature sources, will be added to reinforce new concepts learned during the piano lessons.

The reason for this study is, to determine the effect that learning to play the piano may have on the autistic child and to equip music teachers with valuable information and teaching material to enable them to teach autistic children to learn to play piano.

Parents will be asked to sit in during piano lessons, complete questionnaires and do interviews. Questionnaires will be used to evaluate the effect, influence and impact that piano lessons have on the autistic student.

The questionnaires will be handed to parents before piano lessons commence for the first time and again three and six months thereafter, to evaluate the effect that piano lessons may have had on the student. Data collection will also include unstructured personal interviews with parents on a weekly basis, thus evaluating the parents' experience with regard to the child's progress. Interviews will be transcribed and the identity of parents will be kept strictly confidential. Information collected during the six months will also be kept confidential and no participant or organisation's name will be used at any given time of the research.

While I would greatly appreciate your participation in this study and the valuable contribution you as parent could make towards the research, your participation is entirely voluntary. You are under no obligation to complete interviews or to take part in this study. If you do choose to take part, you may stop at any time an issue arises that makes you feel uncomfortable.

Please feel free to contact me directly should you experience any discomfort or unhappiness regarding the way the research is being conducted, so we may discuss it. Please note that you are also free to contact my study supervisor or co-supervisor (indicated at the top of this letter).

Should any difficult personal issues arise during the course of this research, I will endeavour to contact a qualified expert who will be able to assist you.

Yours sincerely,
Nadia Nell

INFORMED CONSENT

Adapting piano teaching methods for children diagnosed with Autism Spectrum Disorder

Researcher: *Nadia Nell:*

Contact Details: *076 205 7256*

Name and surname of respondent _____

Contact number: _____

Email address: _____

- I hereby give free and informed consent that I will participate in the above mentioned research study.
- I understand what the study is about, why I am participating and what the risks and benefits are.
- I give the researcher permission to make use of the data gathered from my participation, subject to the stipulations she has indicated in the above letter.

Signature: _____ Date: _____

ADDENDUM D: GUARDIAN CONSENT

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA

UFS·UV
HUMANITIES
GEESTESWETENSKAPPE

Researcher:
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nadia@pianostudio.co.za

Research Supervisor:
Dr Frelet de Villiers

Lecturer: Odeion School of Music
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M: 071 6434671

devilliersamf@ufs.ac.za

Research Co-Supervisor:
Dr DJ Griesel

Senior Lecturer: Paediatrics and Child Health
Faculty: Health Sciences, UFS
Bloemfontein
9300

T: +27(0)51 405 3181
M: +27(0)72 601 9158

griesseldj@ufs.ac.za

GUARDIAN CONSENT: DATE: 1 AUGUST 2016

Dear Guardian

I would like to invite you to take part in the following research project:

ADAPTING PIANO TEACHING METHODS FOR CHILDREN DIAGNOSED WITH AUTISM SPECTRUM DISORDER

This study is about teaching children, who have been diagnosed with Autism Spectrum Disorder, to play piano by adapting piano teaching methods using an approach that is better understood by autistic students.

I would like you to participate in this research, as music education specifically in the field of adapting piano teaching methods for children diagnosed with Autism Spectrum Disorder, has not been done yet. Students will be given thirty minute piano lessons at a specific time, on a weekly basis, for a period of six months. The piano material that will be used is “My First Piano Adventure for the Young Beginner, Pre-Reading” (2006) by Nancy and Randall Farber. Additional material such as games, visual aids, video modelling, prompting and adapting communication skills (sign language, hand gestures) that are based on suggestions taken from literature sources, will be added to reinforce new concepts learned during the piano lessons.

The reason for this study is, to determine the effect that learning to play the piano may have on the autistic child and to equip music teachers with valuable information and teaching material to enable them to teach autistic children to learn to play piano.

Guardians will be asked to sit in during piano lessons. Questionnaires will be used to evaluate the effect, influence and impact that piano lessons have on the autistic student.

These questionnaires will be handed to guardians before piano lessons commence the first time and again three and six months after the start of piano lessons, to evaluate the effect that piano lessons may have on the student. Data collection will also include unstructured personal interviews with guardians on a weekly basis, thus evaluating the guardian's experience with regard to the child's progress. Interviews will be transcribed and the identity of guardians will be kept strictly confidential. Information collected during the six months will also be kept confidential and no participant or organisation's name will be used at any given time of the research.

While I would greatly appreciate your participation in this study and the valuable contribution you as guardian could make towards the research, your participation is entirely voluntary. You are under no obligation to complete interviews or to take part in this study. If you do choose to take part, you may stop at any time an issue arises that makes you feel uncomfortable.

Please feel free to contact me directly should you experience any discomfort or unhappiness regarding the way the research is being conducted, so we may discuss it. Please note that you are also free to contact my study supervisor or co-supervisor (indicated at the top of this letter).

Should any difficult personal issues arise during the course of this research, I will endeavour to contact a qualified expert who will be able to assist you.

Yours sincerely,
Nadia Nell

INFORMED CONSENT

Adapting piano teaching methods for children diagnosed with Autism Spectrum Disorder

Researcher: *Nadia Nell:*

Contact Details: *076 205 7256*

Name and surname of respondent _____

Contact number: _____

Email address: _____

- I hereby give free and informed consent that I will participate in the above mentioned research study.
- I understand what the study is about, why I am participating and what the risks and benefits are.
- I give the researcher permission to make use of the data gathered from my participation, subject to the stipulations she has indicated in the above letter.

Signature: _____ Date: _____

ADDENDUM E: TEACHER CONSENT

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA

UFS·UV
HUMANITIES
GEESTESWETENSKAPPE

Researcher:
Nadia Nell

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nadia@pianostudio.co.za

Research Supervisor:
Dr Frelet de Villiers

Lecturer: Odeion School of Music
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Research Co-Supervisor:
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Senior Lecturer: Paediatrics and Child Health
Faculty: Health Sciences, UFS
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M: +27(0)72 601 9158

griesseldj@ufs.ac.za

TEACHER CONSENT DATE: 1 AUGUST 2016

Dear Teacher

I would like to invite you to take part in the following research project:

ADAPTING PIANO TEACHING METHODS FOR CHILDREN DIAGNOSED WITH AUTISM SPECTRUM DISORDER

This study is about teaching children, who have been diagnosed with Autism Spectrum Disorder, to play piano by adapting piano teaching methods, using an approach that is better understood by autistic students.

I would like you to participate in this research, as music education specifically in the field of adapting piano teaching methods for children diagnosed with Autism Spectrum Disorder has not been done yet. Students will be given thirty minute piano lessons at a specific time on a weekly basis for a period of six months. The piano material that will be used is “My First Piano Adventure for the Young Beginner, Pre-Reading” (2006) by Nancy and Randall Farber. Additional material such as games, visual aids, video modelling, prompting and adapting communication skills (sign language, hand gestures) that are based on suggestions taken from literature sources, will be added to reinforce new concepts learned during the piano lessons.

The reason for this study is to determine the effect that learning to play the piano may have on the autistic child and to equip music teachers with valuable information and teaching material to enable them to teach autistic children to learn to play piano.

Questionnaires will be used to evaluate the effect, influence and impact that piano lessons have on the autistic student.

These questionnaires will be handed to teachers before piano lessons commence the first time and again three and six months after the start of the lessons. Data collection will include personal interviews with the teachers three and six months after the start of piano lessons. Interviews will focus on the child's experience of the piano lessons and whether the child repeats the concepts, learned during the piano lessons, at school. Interviews will be transcribed and the identity of teachers will be kept strictly confidential.

While I would greatly appreciate your participation in this study and the valuable contribution you as teacher could make towards the research, your participation is entirely voluntary. You are under no obligation to complete interviews or to take part in this study. If you choose to take part, you may stop at any time an issue arises that makes you feel uncomfortable.

Please feel free to contact me directly should you experience any discomfort or unhappiness regarding the way the research is being conducted, so we may discuss it. Please note that you are also free to contact my study supervisor or co-supervisor (indicated at the top of this letter).

Yours sincerely,
Nadia Nell

INFORMED CONSENT

Adapting piano teaching methods for children diagnosed with Autism Spectrum Disorder

Researcher: *Nadia Nell:*

Contact Details: *076 205 7256*

Name and surname of respondent _____

Contact number: _____

Email address: _____

- I hereby give free and informed consent that I will participate in the above mentioned research study.
- I understand what the study is about, why I am participating and what the risks and benefits are.
- I give the researcher permission to make use of the data gathered from my participation, subject to the stipulations she has indicated in the above letter.

Signature: _____ Date: _____

ADDENDUM F: PARENT CONSENT ON BEHALF OF AUTISTIC PARTICIPANT

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA
UFS·UV HUMANITIES GEESTESWETENSKAPPE

Researcher:
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Lecturer: Odeion School of Music
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devilliersamf@ufs.ac.za

Research Co-Supervisor:
Dr DJ Griesel

Senior Lecturer: Paediatrics and Child Health
Faculty: Health Sciences, UFS
Bloemfontein
9300

T: +27(0)51 405 3181
M: +27(0)72 601 9158

griesseldj@ufs.ac.za

Date: 1 August 2016

INFORMED CONSENT:

Dear parent of participant

I would like to invite your child to take part in the following research project:

ADAPTING PIANO TEACHING METHODS FOR CHILDREN DIAGNOSED WITH AUTISM SPECTRUM DISORDER

This study is about teaching children, who have been diagnosed with Autism Spectrum Disorder, to play piano by adapting piano teaching methods using an approach that is better understood by autistic students.

I would like your child to participate in this research, as research in music education specifically in the field of adapting piano teaching methods for children diagnosed with Autism Spectrum Disorder has not been done yet. Children will be given thirty minute piano lessons at a specific time on a weekly basis for a period of six months. The piano material that will be used is "My First Piano Adventure for the Young Beginner, Pre-Reading" (2006) by Nancy and Randall Farber. Additional material such as games, visual aids, video modelling, prompting and adapting communication skills (sign language, hand gestures) that are based on suggestions taken from literature sources, will be added to reinforce new concepts learned during the piano lessons.

The reason for this study is to determine the effect that learning to play the piano may have on the autistic child and to equip music teachers with valuable information and teaching material to enable them to teach autistic children to learn to play piano.

Piano lessons will be video recorded, thus allowing the researcher to observe and evaluate the progress that the child makes over the period of six months.

Video recordings will be strictly confidential and will only be used to enable the researcher optimal observation and evaluation of piano lessons. Children may be asked to do piano homework during the course of the week, focusing on one concept only or technique learned in class. Homework may include a video clip of the researcher demonstrating a technique or a homework activity.

The possible risks to the autistic student in taking part in this study include that he/she may experience a sensory overload during a piano lesson and/or get emotionally involved in the lessons. Students may experience an interruption in their weekly schedule when piano lessons are discontinued; both an overload in sensory stimuli and an abrupt discontinuation of piano lessons may lead to meltdowns and tantrums.

The following steps will be taken to decrease risks to the autistic student:

- A cooling down room will be provided, allowing the student to calm down when he/she feels overwhelmed.

- The students will be informed a month in advance that piano lessons will be discontinued.

- The last four lessons will take place at two, three and four week intervals, making sure that lessons are discontinued over a period of time and not abruptly.

While I would greatly appreciate your permission for your child to participate in this study and the valuable contribution he/she will make towards the research, your permission is entirely voluntary and you are under no obligation to let your child participate in this study. If you choose to allow your child to take part, you may stop his/her participation whenever an issue arises that makes you feel uncomfortable, with no repercussions.

Please feel free to contact me directly should you experience any discomfort or unhappiness regarding the way the research is being conducted, so we may discuss it. Please note that you are also free to contact my study supervisor or co-supervisor (indicated at the top of this letter).

Yours sincerely,
Nadia Nell

INFORMED CONSENT

Adapting piano teaching methods for children diagnosed with Autism Spectrum Disorder

Researcher: *Nadia Nell:*

Contact Details: *076 205 7256*

Name and surname of child _____

Contact number: _____

Email address: _____

- I hereby give free and informed consent that my child may participate in the above mentioned research study.
- I understand what the study is about, why he/she is participating and what the risks and benefits are.
- I give the researcher permission to make use of the data gathered from my child's participation, subject to the stipulations she has indicated in the above letter.

Signature: _____ Date: _____

ADDENDUM G: GUARDIAN CONSENT ON BEHALF OF AUTISTIC PARTICIPANT

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA
UFS·UV HUMANITIES GEESTESWETENSKAPPE

Researcher:
Nadia Nell

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nadia@pianostudio.co.za

Research Supervisor:
Dr Frelet de Villiers

Lecturer: Odeion School of Music
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devilliersamf@ufs.ac.za

Research Co-Supervisor:
Dr DJ Griesel

Senior Lecturer: Paediatrics and Child Health
Faculty: Health Sciences, UFS
Bloemfontein
9300

T: +27(0)51 405 3181
M: +27(0)72 601 9158

griesseldj@ufs.ac.za

Date: 1 August 2016

INFORMED CONSENT:

Dear guardian of participant

I would like to invite your child to take part in the following research project:

ADAPTING PIANO TEACHING METHODS FOR CHILDREN DIAGNOSED WITH AUTISM SPECTRUM DISORDER

This study is about teaching children, who have been diagnosed with Autism Spectrum Disorder, to play piano by adapting piano teaching methods using an approach that is better understood by autistic students.

I would like your child to participate in this research, as research in music education specifically in the field of adapting piano teaching methods for children diagnosed with Autism Spectrum Disorder has not been done yet. Children will be given thirty minute piano lessons at a specific time on a weekly basis for a period of six months. The piano material that will be used is “My First Piano Adventure for the Young Beginner, Pre-Reading” (2006) by Nancy and Randall Farber. Additional material such as games, visual aids, video modelling, prompting and adapting communication skills (sign language, hand gestures) that are based on suggestions taken from literature sources, will be added to reinforce new concepts learned during the piano lessons.

The reason for this study is to determine the effect that learning to play the piano may have on the autistic child and to equip music teachers with valuable information and teaching material to enable them to teach autistic children to learn to play piano.

Piano lessons will be video recorded, thus allowing the researcher to observe and evaluate the progress that the child makes over the period of six months.

Video recordings will be strictly confidential and will only be used to enable the researcher optimal observation and evaluation of piano lessons. Children may be asked to do piano homework during the course of the week focusing on one concept only or technique learned in class. Homework may include a video clip of the researcher demonstrating a technique or a homework activity.

The possible risks to the autistic student in taking part in this study include that he/she may experience a sensory overload during a piano lesson and/or get emotionally involved in the lessons. Students may experience an interruption in their weekly schedule when piano lessons are discontinued; both an overload in sensory stimuli and an abrupt discontinuation of piano lessons may lead to meltdowns and tantrums.

The following steps will be taken to decrease risks to the autistic student:

- A cooling down room will be provided, allowing the student to calm down when he/she feels overwhelmed.

- The students will be informed a month in advance that piano lessons will be discontinued.

- The last four lessons will take place at two, three and four week intervals, making sure that lessons are discontinued over a period of time and not abruptly.

While I would greatly appreciate your permission for your child to participate in this study and the valuable contribution he/she will make towards the research, your permission is entirely voluntary and you are under no obligation to let your child participate in this study. If you choose to allow your child to take part, you may stop his/her participation whenever an issue arises that makes you feel uncomfortable, with no repercussions.

Please feel free to contact me directly should you experience any discomfort or unhappiness regarding the way the research is being conducted, so we may discuss it. Please note that you are also free to contact my study supervisor or co-supervisor (indicated at the top of this letter).

Yours sincerely,
Nadia Nell

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA
UFS·UV HUMANITIES GEESTESWETENSKAPPE

INFORMED CONSENT

Adapting piano teaching methods for children diagnosed with Autism Spectrum Disorder

Researcher: *Nadia Nell:*

Contact Details: *076 205 7256*

Name and surname of child _____

Contact number: _____

Email address: _____

- I hereby give free and informed consent that my child may participate in the above mentioned research study.
- I understand what the study is about, why he/she is participating and what the risks and benefits are.
- I give the researcher permission to make use of the data gathered from my child's participation, subject to the stipulations she has indicated in the above letter.

Signature: _____ Date: _____

ADDENDUM H: INSTITUTIONAL PERMISSION LETTER

UNIVERSITY OF THE FREE STATE
UNIVERSITEIT VAN DIE VRYSTAAT
YUNIVESITHI YA FREISTATA

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Researcher:
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Research Co-Supervisor:
Dr DJ Griesel

Senior Lecturer: Paediatrics and Child Health
Faculty: Health Sciences, UFS
Bloemfontein
9300

T: +27(0)51 405 3181
M: +27(0)72 601 9158

griesseldj@ufs.ac.za

Date: 1 August 2016

INFORMED CONSENT:

Dear Principle

I, Nadia Nell, am presently doing research towards a Master's Degree in Music at the University of the Free State with the help of Dr. Frelet de Villiers, a lecturer at the Department of Humanities and Dr. David Griessel, Senior Lecturer and Principal Specialist in Paediatrics and Child Health at the Department of Health Science. We are inviting you to participate in a study titled, 'Adapting piano teaching methods for children diagnosed with Autism Spectrum Disorder'.

The aim of the study is to combine teaching approaches found to be successful in teaching autistic learners in the school environment, with the Piano Adventure method books. Your school has been selected, because the study will focus on giving piano lessons to children diagnosed with Autism Spectrum Disorder. Piano lessons will be given to individuals on level one or level two described by the Diagnostic Statistical Manual-5 (American Psychaitric Association, 2013).

The study will entail Action Research, as the participant and researcher will be actively involved in the research. Learners will attend piano lessons once a week, for a period of six months, accompanied by the parent or caregiver who will sit in during piano lessons. The piano lessons will include learning the topography (black and white keys), Music Alphabet, connecting the music alphabet with specific white keys on the piano, note direction (music going up and down), rhythm, connecting notes on the piano with specific notes on the staff and reading basic music notation.

Questionnaires, interviews and journals will be kept on all learners, to gather data about the progress of piano lessons. The objective of this study is to adapt piano teaching methods in a way that will be understood by individuals diagnosed with Autism Spectrum Disorder and to help music teachers to teacher autistic learners.

There are potential risks, such as the everyday risk of bringing the child to piano lessons. Learners may get emotionally involved in the lessons and may experience an interruption in their weekly schedule when piano lessons are discontinued. The may lead to meltdowns or tantrums. To prevent any risk to the autistic learner, they will be informed a month in advance that piano lessons will be discontinued and the last four lessons will be done over a period of two, three and four weeks making sure that lessons discontinue over a period of time and not abruptly. Feedback will be done weekly, when parents and caregiver will be informed about the participant's progress if any, and will be given monthly to class teachers.

Yours sincerely
Nadia Nell

INFORMED CONSENT

Adapting piano teaching methods for children diagnosed with Autism Spectrum Disorder

Researcher: *Nadia Nell:*

Contact Details: *076 205 7256*

Name and surname _____ _____

Contact number: _____

Email address: _____ _____

- I hereby give free and informed consent that the staff may participate in the above mentioned research study.
- I understand what the study is about, why he/she is participating and what the risks and benefits are.
- I give the researcher permission to make use of the data gathered from the staff's participation, subject to the stipulations she has indicated in the above letter.

Signature: _____ Date: _____

ADDENDUM I: ETHICS CLEARANCE LETTER

Office of the Vice-Rector: Research
Kantoor van die Viserektor: Navorsing

Senate Research Ethics Committee

01-Aug-2016

Dear **Miss Nell**

Ethics Clearance: **Adapting piano teaching methods for children diagnosed with Autism Spectrum Disorder**

Principal Investigator: **Miss Nadia Nell**

Department: **Odeion School of Music (Bloemfontein Campus)**

SENATE RESEARCH ETHICS COMMITTEE APPEAL: APPLICATION APPROVED

With reference to your appeal for ethical clearance, the Senate Research Ethics Committee has considered your appeal. I am pleased to inform you on behalf of the Senate Research Ethics Committee that you have been granted ethical clearance for your research.

Your ethical clearance number, to be used in all correspondence is: **UFS-HSD2016/0339**

This ethical clearance number is valid for research conducted for one year from issuance. Should you require more time to complete this research, please apply for an extension.

We request that any changes that may take place during the course of your research project be submitted to the ethics office to ensure we are kept up to date with your progress and any ethical implications that may arise.

Thank you for submitting this proposal for ethical clearance and we wish you every success with your research.

Yours Sincerely

Prof. Corli Witthuhn
Chair: Senate Research Ethics Committee

ADDENDUM J: BIOGRAPHIC QUESTIONNAIRE

Adapting piano teaching methods for children diagnosed with Autism Spectrum Disorder

I would like to invite you and your child to take part in this research project:

For the validity of the study it is important that autistic participants have been diagnosed by a medical practitioner or psychologist. Children diagnosed with Autism experience impairment in social communication and social interaction, as well as, restricted repetitive patterns of behaviour or interest. Children with autism also experience a hyporesponsiveness and hyperresponsiveness to sensory stimuli which is important to consider during piano lessons as sensory organs are used during the acquisition of music.

For the success of the research study the following questions have to be answered for optimal adaptation of teaching methods during the piano lessons. Each child's sensory sensitivity will be considered during the lesson to minimise a sensory overload.

1) Have your child been diagnosed with Autism Spectrum Disorder?

Mark only one oval.

- ◯ Yes
- ◯ No

2) If yes, who was the practitioner or therapists that diagnosed the child?

3a) What was the diagnoses of the professional practitioner?

3b) What level of Autism was the child diagnosed with? (E.g. DSM-IV: Asperger, High-Functioning, ASD with cognitive paired and delayed speech. DSM-V: Level 1-require support, Level 2: require substantial support.)

4) Is the child Hypo-or-Hyper sensitive to the following sensory stimuli?

Hypo - Low sensitivity
Hyper- High sensitivity

a) Touch
Mark only one oval.

- ◯ Hypo
- ◯ Hyper

b) Smell
Mark only one oval.

- ◯ Hypo
- ◯ Hyper

c) Vision
Mark only one oval.

- ◯ Hypo
- ◯ Hyper

d) Aural
Mark only one oval.

- ◯ Hypo
- ◯ Hyper

e)Taste
Mark only one oval.

- ◯ Hypo
- ◯ Hyper

f) Vestibular (movement and balance)
Mark only one oval.

- ◯ Hypo
- ◯ Hyper

g) Proprioception (Know where your body is in space)
Mark only one oval.

- ◯ Hypo
- ◯ Hyper

h) Interoception (body function senses)
Mark only one oval.

- ◯ Hypo
- ◯ Hyper

ADDENDUM K: PARENT QUESTIONNAIRE PRE-DATA

Adapting piano teaching methods for children diagnosed with Autism Spectrum Disorder

Please answer all the questions. The purpose of the following questionnaire is to evaluate the effect that piano lessons will have on children diagnosed with Autism Spectrum Disorder. The questionnaire seeks to determine the validity and reliability of the study and determine whether, if any, changes occurred in the child's behaviour during the period of the lessons. More then one answer may be ticked where applicable, e.g. Is your child sad _____ anxious _X_ upset _X_
The following questionnaire is to evaluate the student

1a) Is your child usually happy?
Tick all that apply.

- [ ] Yes
- [ ] No

1b) If no, is he/she
Tick all that apply.

- [ ] Sad
- [ ] Anxious
- [ ] Upset

2a) Are you concerned about your child's fine motor skills?
Tick all that apply.

- [ ] Yes
- [ ] No

2b) If yes, can he/she
Tick all that apply.

- [ ] Write and hold fine objects
- [ ] Roll over
- [ ] Sit
- [ ] Stand
- [ ] Walk
- [ ] Run

Page 1 of 4

3a) Does your child have a generic syndrome?
Tick all that apply.

- [ ] Yes
- [ ] No

3b) If yes, what genetic syndrome does he/she have?

_____

_____

_____

_____

_____

4a) Does your child have a neurological syndrome?
Tick all that apply.

- [ ] Yes
- [ ] No

4b) If yes, what neurological syndrome does he/she have?

_____

_____

_____

_____

_____

5) Has your child ever have a seizure?
Tick all that apply.

- [ ] Yes
- [ ] No

6a) Are you concerned about his/her learning abilities?
Tick all that apply.

- [ ] Yes
- [ ] No

6b) If yes, are you
Tick all that apply.

- [ ] A little concerned?
- [ ] Somewhat concerned?
- [ ] Very Concerned?

7a) Does the child have problems with attending to others?
Tick all that apply.

- [ ] Yes
- [ ] No

7b) Does he/she have problems in communicating with others?
Tick all that apply.

- [ ] Yes
- [ ] No

7c) Does he/she have problems with unusual repetitive behaviours?
Tick all that apply.

- [ ] Yes
- [ ] No

8) Are you concerned about his/her language development?
Tick all that apply.

- [ ] Yes
- [ ] No

9) Does the child repeatedly hit others?
Tick all that apply.

- [ ] Yes
- [ ] No

10) Does he/she repeatedly destroy objects?
Tick all that apply.

- [ ] Yes
- [ ] No

11) Does he/she purposely and repeatedly injure him/herself, e.g. head-bang, bite him/herself, scratch him/herself, pull his/her hair?

Tick all that apply.

- [ ] Yes
- [ ] No

12) Does the child make any body movement that you are concerned about, e.g. body rocking, hand waving, head weaving?

Tick all that apply.

- [ ] Yes
- [ ] No

13a) Do you have any other concerns about his/her development?

Tick all that apply.

- [ ] Yes
- [ ] No

13b) If yes, what concerns do you have regarding the development?

ADDENDUM L: TEACHER QUESTIONNAIRE PRE-DATA

Adapting piano teaching methods for children diagnosed with Autism Spectrum Disorder

Please answer all the questions. The purpose of the following questionnaire is to evaluate the effect that piano lessons will have on children diagnosed with Autism Spectrum Disorder. The questionnaire seeks to determine the validity and reliability of the study and determine whether, if any, changes occurred in the child's behaviour during the period of the lessons. More then one answer may be ticked where applicable, e.g. Is your child sad _____ anxious _X_ upset _X_
The following questionnaire is to evaluate the student

1a) Is he/she usually happy at school?
Check all that apply.

- [ ] Yes
- [ ] No

1b) If not, is he/she
Check all that apply.

- [ ] Sad
- [ ] Anxious
- [ ] Upset

2a) Are you concerned about the child fine motor skills?
Check all that apply.

- [ ] Yes
- [ ] No

2b) If yes, can he/she
Check all that apply.

- [ ] Write and hold find objects
- [ ] Roll over
- [ ] Sit
- [ ] Stand
- [ ] Walk
- [ ] Run

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3a) Are you concerned about his/her learning abilities?
Check all that apply.

- [ ] Yes
- [ ] No

3b) If yes, are you
Check all that apply.

- [ ] A little concerned?
- [ ] Somewhat concerned?
- [ ] Very concerned?

4a) Does the child have problems with attending to others?
Check all that apply.

- [ ] Yes
- [ ] No

4b) Does he/she have problems in communicating with others?
Check all that apply.

- [ ] Yes
- [ ] No

4c) Does he/she have problems with unusual repetitive behaviour?
Check all that apply.

- [ ] Yes
- [ ] No

5) Are you concerned about his/her language development?
Check all that apply.

- [ ] Yes
- [ ] No

6) Does the child repeatedly hit others?
Check all that apply.

- [ ] Yes
- [ ] No

7) Does he/she repeatedly destroy objects?
Check all that apply.

- [ ] Yes
- [ ] No

8) Does he/she purposely and repeatedly injure him/herself, e.g. head-bang, bite him/herself, scratch him/herself, pull his/her hair?
Check all that apply.

- [ ] Yes
- [ ] No

9) Does the child make any body movement that you are concerned about, e.g. body rocking, hand waving, head weaving?
Check all that apply.

- [ ] Yes
- [ ] No

10a) Do you have any other concerns about his/her development?
Check all that apply.

- [ ] Yes
- [ ] No

10b) If yes, what concerns do you have regarding the development?

ADDENDUM M: PARENT QUESTIONNAIRE THREE MONTHS

Adapting piano teaching methods for children diagnosed with autism spectrum disorder

Please answer all the questions. The purpose of the following questionnaire is to evaluate the effect that piano lessons have on children diagnosed with Autism Spectrum Disorder after a period of three and six months. The questionnaire seeks to determine the validity and reliability of the study and determine whether, if any, changes occurred in the child's behaviour during the period of the lessons. More then one answer may be ticked where applicable, e.g. Is your child sad _____ anxious _X_ upset _X_

1a) Does your child enjoy the piano lessons?
Check all that apply.

- [ ] Yes
- [ ] No

1b) How does your child experience the piano lessons?

1c) Does your child tend to repeat words, sentences or actions learnt in the piano lesson?
Check all that apply.

- [ ] Yes
- [ ] No

2a) Is your child usually happy?
Check all that apply.

- [ ] Yes
- [ ] No

2b) If no is he/she
Check all that apply.

- [ ] Sad
- [ ] Anxious
- [ ] Upset

3a) Are you concerned about your child's fine motor skills
Check all that apply.

- [ ] Yes
- [ ] No

3b) If yes, can he/she?
Check all that apply.

- [ ] Write and hold fine objects
- [ ] Roll over
- [ ] Sit
- [ ] Stand
- [ ] Walk
- [ ] Run

4a) Does your child have a genetic syndrome?
Check all that apply.

- [ ] Yes
- [ ] No

4b) If yes, what genetic syndrome does he/she have?

5a) Does your child have a neurological syndrome?
Check all that apply.

- [ ] Yes
- [ ] No

5b) If yes, what neurological syndrome does he/she have?

6) Did your child ever have a seizure?
Check all that apply.

- [ ] Yes
- [ ] No

7a) Are you concerned about his/her learning abilities?
Check all that apply.

- [ ] Yes
- [ ] No

7b) If yes, are you
Check all that apply.

- [ ] a little concerned?
- [ ] somewhat concerned?
- [ ] very concerned?

8a) Does he/she have problems with attending to others?
Check all that apply.

- [ ] Yes
- [ ] No

8b) Does he/she have problems with communicating to others?
Check all that apply.

- [ ] Yes
- [ ] No

8c) Does he/she have problems with unusual repetitive behaviour?
Check all that apply.

- [ ] Yes
- [ ] No

9) Are you concerned about his/her language development?
Check all that apply.

- [ ] Yes
- [ ] No

10) Does your child repeatedly hit other people?
Check all that apply.

- [ ] Yes
- [ ] No

11) Does he/she repeatedly destroy objects?
Check all that apply.

- [ ] Yes
- [ ] No

12) Does he/she purposely and repeatedly injure him/herself, e.g. head-bang, bite-self, scratch-self, pull his/her hair?
Check all that apply.

- [ ] Yes
- [ ] No

13) Does you child make any body movement that you are concerned about, e.g. body rocking, hand waving, head weaving?
Check all that apply.

- [ ] Yes
- [ ] No

14a) Do you have any other concerns about his/her development?
Check all that apply.

- [ ] Yes
- [ ] No

14b) If yes, what concerns do you have regarding your child's development?

15a) Do you find that there was a change in your child's emotions, since starting with piano lessons?
Check all that apply.

- [ ] Yes
- [ ] No

15b) If yes, how did his/her emotions changed?

16a) Do you find that he/she is calmer since starting with piano lessons?
Check all that apply.

- [ ] Yes
- [ ] No

16b) Do you find that he/she is less sad since starting with piano lessons?
Check all that apply.

- [ ] Yes
- [ ] No

16c) Do you find that he/she is less anxious since starting with piano lessons?
Check all that apply.

- [ ] Yes
- [ ] No

16d) Do you find that he/she is less upset since starting with piano lessons?
Check all that apply.

- [ ] Yes
- [ ] No

17a) Do you find that his/her behaviour has change since starting with piano lessons?
Check all that apply.

- [ ] Yes
- [ ] No

17b) Do you find that the change in behaviour only occurs during the lesson or is there a change in behaviour during the week?

18) Do you find an improvement in social skills and communication since he/she started with piano lessons?

Check all that apply.

- [ ] Yes
- [ ] No

19)Do you find an improvement in his/her learning abilities and concentration, since starting with piano lessons?

Check all that apply.

- [ ] Yes
- [ ] No

20a) Has his/her hand coordination improved?

Check all that apply.

- [ ] Yes
- [ ] No

20b) If yes, how has it improved?

37. **21a) Have his/her fine motor skills improve since starting piano lessons?**

Check all that apply.

- [ ] Yes
- [ ] No

21b) If yes, how have they improved?

22a) Has his/her motor development improve since starting piano lessons?
Check all that apply.

- [ ] Yes
- [ ] No

22b) If yes, how has it improved?

23) Do you as parent find that the piano lessons had a positive influence on the child?
Check all that apply.

- [ ] Yes
- [ ] No

24) If yes, how did the piano lessons positively influence the child?

ADDENDUM N: TEACHER QUESTIONNAIRE THREE MONTHS

Adapting piano teaching methods for children diagnosed with autism spectrum disorder

Please answer all the questions. The purpose of the following questionnaire is to evaluate the effect that piano lessons have on children diagnosed with Autism Spectrum Disorder over a period of three and six months. The questionnaire seeks to determine the validity and reliability of the study and determine whether, if any, changes occurred in the child's behaviour during the period of the lessons. More then one answer may be ticked where applicable, e.g. Is your child sad _____ anxious _X_ upset _X_

1) Does the child talk about piano lessons or music more often at school than he/she used to?

Tick all that apply.

- [ ] Yes
- [ ] No

2a) Is he/she usually happy at school?

Tick all that apply.

- [ ] Yes
- [ ] No

2b) If not, is he/she

Tick all that apply.

- [ ] Sad
- [ ] Anxious
- [ ] Upset

3a) Are you concerned about the child's fine motor skills?

Tick all that apply.

- [ ] Yes
- [ ] No

3b) If yes can he/she
Tick all that apply.

- [ ] Write and hold fine objects
- [ ] Roll over
- [ ] Sit
- [ ] Stand
- [ ] Walk
- [ ] Run

4a) Are you concerned about his/her learning abilities?
Tick all that apply.

- [ ] Yes
- [ ] No

4b) If yes, are you
Tick all that apply.

- [ ] a little concerned?
- [ ] somewhat concerned?
- [ ] very concerned?

5a) Does the child have problems with attending to others?
Tick all that apply.

- [ ] Yes
- [ ] No

5b) Does he/she have problems in communicating to others?
Tick all that apply.

- [ ] Yes
- [ ] No

5c) Does he/she have problems with unusual repetitive behaviour?
Tick all that apply.

- [ ] Yes
- [ ] No

6) Are you concerned about his/her language development?
Tick all that apply.

- [ ] Yes
- [ ] No

7) Does the child repeatedly hit others?

Tick all that apply.

- [ ] Yes
- [ ] No

8) Does he/she repeatedly destroy objects?

Tick all that apply.

- [ ] Yes
- [ ] No

9) Does he/she purposely and repeatedly injure him/herself, e.g. head-bang, bite-him/herself, scratch-him/herself, pull his/her hair?

Tick all that apply.

- [ ] Yes
- [ ] No

10) Does the child make any body movement that you are concerned about, e.g. body rocking, hand waving, head weaving?

Tick all that apply.

- [ ] Yes
- [ ] No

11a) Do you have any other concerns about the his/her development?

Tick all that apply.

- [ ] Yes
- [ ] No

11b) If yes, what concerns do you have regarding the development?

12a) Do you find that there was a change in the child's emotion's, since starting with piano lessons?

Tick all that apply.

- [ ] Yes
- [ ] No

12b) If yes, how did his/her emotions changed?

13a)Do you find that he/she is calmer since starting with piano lessons?
Tick all that apply.

- [ ] Yes
- [ ] No

13b) Do you find he/she is less sad since starting with piano lessons?
Tick all that apply.

- [ ] Yes
- [ ] No

13c) Do you find that he/she is less anxious since starting with piano lessons?
Tick all that apply.

- [ ] Yes
- [ ] No

13d) Do you find that he/she is less upset since starting with piano lessons?
Tick all that apply.

- [ ] Yes
- [ ] No

14) Do you find that his/her behaviour has change since starting with piano lessons?
Tick all that apply.

- [ ] Yes
- [ ] No

15) Do you find an improvement in social skills and communication since he/she started with piano lessons?
Tick all that apply.

- [ ] Yes
- [ ] No

16) Do you find an improvement in his/her learning abilities and concentration since starting with piano lessons?

Tick all that apply.

- [ ] Yes
- [ ] No

17a) Has his/her hand coordination improved?

Tick all that apply.

- [ ] Yes
- [ ] No

17b) If yes, how has it improved?

18a) Have his/her fine motor skills improve since starting with piano lessons?

Tick all that apply.

- [ ] Yes
- [ ] No

18b) If yes, how have they improved?

19a) Has his/her motor development improve since starting piano lessons?

Tick all that apply.

- [ ] Yes
- [ ] No

19b) If yes, how has it improved?

20) Do you, as teacher, find that the piano lessons had a positive influence on the child?

Tick all that apply.

- [ ] Yes
- [ ] No

21) If yes, how did the piano lessons positively influence the child

ADDENDUM O: PARENT QUESTIONNAIRE SIX MONTHS

Adapting piano teaching methods for children diagnosed with autism spectrum disorder

Please answer all the questions. The purpose of the following questionnaire is to evaluate the effect that piano lessons have on children diagnosed with Autism Spectrum Disorder after a period of three and six months. The questionnaire seeks to determine the validity and reliability of the study and determine whether, if any, changes occurred in the child's behaviour during the period of the lessons. More then one answer may be ticked where applicable, e.g. Is your child sad _____ anxious _X_ upset _X_

1a) Does your child enjoy the piano lessons?
Check all that apply.

- [ ] Yes
- [ ] No

1b) How does your child experience the piano lessons?

1c) Does your child tend to repeat words, sentences or actions learnt in the piano lesson?
Check all that apply.

- [ ] Yes
- [ ] No

2a) Is your child usually happy?
Check all that apply.

- [ ] Yes
- [ ] No

2b) If no is he/she
Check all that apply.

- [ ] Sad
- [ ] Anxious
- [ ] Upset

3a) Are you concerned about your child's fine motor skills
Check all that apply.

- [ ] Yes
- [ ] No

3b) If yes, can he/she?
Check all that apply.

- [ ] Write and hold fine objects
- [ ] Roll over
- [ ] Sit
- [ ] Stand
- [ ] Walk
- [ ] Run

4a) Does your child have a genetic syndrome?
Check all that apply.

- [ ] Yes
- [ ] No

4b) If yes, what genetic syndrome does he/she have?

5a) Does your child have a neurological syndrome?
Check all that apply.

- [ ] Yes
- [ ] No

5b) If yes, what neurological syndrome does he/she have?

6) Did your child ever have a seizure?
Check all that apply.

- [ ] Yes
- [ ] No

7a) Are you concerned about his/her learning abilities?
Check all that apply.

- [ ] Yes
- [ ] No

7b) If yes, are you
Check all that apply.

- [ ] a little concerned?
- [ ] somewhat concerned?
- [ ] very concerned?

8a) Does he/she have problems with attending to others?
Check all that apply.

- [ ] Yes
- [ ] No

8b) Does he/she have problems with communicating to others?
Check all that apply.

- [ ] Yes
- [ ] No

8c) Does he/she have problems with unusual repetitive behaviour?
Check all that apply.

- [ ] Yes
- [ ] No

9) Are you concerned about his/her language development?
Check all that apply.

- [ ] Yes
- [ ] No

10) Does your child repeatedly hit other people?
Check all that apply.

- [ ] Yes
- [ ] No

11) Does he/she repeatedly destroy objects?

Check all that apply.

- [ ] Yes
- [ ] No

12) Does he/she purposely and repeatedly injure him/herself, e.g. head-bang, bite-self, scratch-self, pull his/her hair?

Check all that apply.

- [ ] Yes
- [ ] No

13) Does you child make any body movement that you are concerned about, e.g. body rocking, hand waving, head weaving?

Check all that apply.

- [ ] Yes
- [ ] No

14a) Do you have any other concerns about his/her development?

Check all that apply.

- [ ] Yes
- [ ] No

14b) If yes, what concerns do you have regarding your child's development?

15a) Do you find that there was a change in your child's emotions, since starting with piano lessons?

Check all that apply.

- [ ] Yes
- [ ] No

15b) If yes, how did his/her emotions changed?

16a) Do you find that he/she is calmer since starting with piano lessons?
Check all that apply.

- [ ] Yes
- [ ] No

16b) Do you find that he/she is less sad since starting with piano lessons?
Check all that apply.

- [ ] Yes
- [ ] No

16c) Do you find that he/she is less anxious since starting with piano lessons?
Check all that apply.

- [ ] Yes
- [ ] No

16d) Do you find that he/she is less upset since starting with piano lessons?
Check all that apply.

- [ ] Yes
- [ ] No

17a) Do you find that his/her behaviour has change since starting with piano lessons?
Check all that apply.

- [ ] Yes
- [ ] No

17b) Do you find that the change in behaviour only occurs during the lesson or is there a change in behaviour during the week?

18) Do you find an improvement in social skills and communication since he/she started with piano lessons?

Check all that apply.

- [ ] Yes
- [ ] No

19)Do you find an improvement in his/her learning abilities and concentration, since starting with piano lessons?

Check all that apply.

- [ ] Yes
- [ ] No

20a) Has his/her hand coordination improved?

Check all that apply.

- [ ] Yes
- [ ] No

20b) If yes, how has it improved?

37. **21a) Have his/her fine motor skills improve since starting piano lessons?**

Check all that apply.

- [ ] Yes
- [ ] No

21b) If yes, how have they improved?

22a) Has his/her motor development improve since starting piano lessons?
Check all that apply.

- [ ] Yes
- [ ] No

22b) If yes, how has it improved?

23) Do you as parent find that the piano lessons had a positive influence on the child?
Check all that apply.

- [ ] Yes
- [ ] No

24) If yes, how did the piano lessons positively influence the child?

ADDENDUM P: TEACHER QUESTIONNAIRE SIX MONTHS

Adapting piano teaching methods for children diagnosed with autism spectrum disorder

Please answer all the questions. The purpose of the following questionnaire is to evaluate the effect that piano lessons have on children diagnosed with Autism Spectrum Disorder over a period of three and six months. The questionnaire seeks to determine the validity and reliability of the study and determine whether, if any, changes occurred in the child's behaviour during the period of the lessons. More then one answer may be ticked where applicable, e.g. Is your child sad _____ anxious _X_ upset _X_

1) Does the child talk about piano lessons or music more often at school than he/she used to?

Tick all that apply.

- ☐ Yes
- ☐ No

2a) Is he/she usually happy at school?

Tick all that apply.

- ☐ Yes
- ☐ No

2b) If not, is he/she

Tick all that apply.

- ☐ Sad
- ☐ Anxious
- ☐ Upset

3a) Are you concerned about the child's fine motor skills?

Tick all that apply.

- ☐ Yes
- ☐ No

3b) If yes can he/she
Tick all that apply.

- [ ] Write and hold fine objects
- [ ] Roll over
- [ ] Sit
- [ ] Stand
- [ ] Walk
- [ ] Run

4a) Are you concerned about his/her learning abilities?
Tick all that apply.

- [ ] Yes
- [ ] No

4b) If yes, are you
Tick all that apply.

- [ ] a little concerned?
- [ ] somewhat concerned?
- [ ] very concerned?

5a) Does the child have problems with attending to others?
Tick all that apply.

- [ ] Yes
- [ ] No

5b) Does he/she have problems in communicating to others?
Tick all that apply.

- [ ] Yes
- [ ] No

5c) Does he/she have problems with unusual repetitive behaviour?
Tick all that apply.

- [ ] Yes
- [ ] No

6) Are you concerned about his/her language development?
Tick all that apply.

- [ ] Yes
- [ ] No

7) Does the child repeatedly hit others?

Tick all that apply.

- [ ] Yes
- [ ] No

8) Does he/she repeatedly destroy objects?

Tick all that apply.

- [ ] Yes
- [ ] No

9) Does he/she purposely and repeatedly injure him/herself, e.g. head-bang, bite-him/herself, scratch-him/herself, pull his/her hair?

Tick all that apply.

- [ ] Yes
- [ ] No

10) Does the child make any body movement that you are concerned about, e.g. body rocking, hand waving, head weaving?

Tick all that apply.

- [ ] Yes
- [ ] No

11a) Do you have any other concerns about the his/her development?

Tick all that apply.

- [ ] Yes
- [ ] No

11b) If yes, what concerns do you have regarding the development?

12a) Do you find that there was a change in the child's emotion's, since starting with piano lessons?

Tick all that apply.

- [ ] Yes
- [ ] No

12b) If yes, how did his/her emotions changed?

13a)Do you find that he/she is calmer since starting with piano lessons?
Tick all that apply.

- [ ] Yes
- [ ] No

13b) Do you find he/she is less sad since starting with piano lessons?
Tick all that apply.

- [ ] Yes
- [ ] No

13c) Do you find that he/she is less anxious since starting with piano lessons?
Tick all that apply.

- [ ] Yes
- [ ] No

13d) Do you find that he/she is less upset since starting with piano lessons?
Tick all that apply.

- [ ] Yes
- [ ] No

14) Do you find that his/her behaviour has change since starting with piano lessons?
Tick all that apply.

- [ ] Yes
- [ ] No

15) Do you find an improvement in social skills and communication since he/she started with piano lessons?
Tick all that apply.

- [ ] Yes
- [ ] No

16) Do you find an improvement in his/her learning abilities and concentration since starting with piano lessons?

Tick all that apply.

- [ ] Yes
- [ ] No

17a) Has his/her hand coordination improved?

Tick all that apply.

- [ ] Yes
- [ ] No

17b) If yes, how has it improved?

18a) Have his/her fine motor skills improve since starting with piano lessons?

Tick all that apply.

- [ ] Yes
- [ ] No

18b) If yes, how have they improved?

19a) Has his/her motor development improve since starting piano lessons?

Tick all that apply.

- [ ] Yes
- [ ] No

19b) If yes, how has it improved?

20) Do you, as teacher, find that the piano lessons had a positive influence on the child?

Tick all that apply.

- [ ] Yes
- [ ] No

21) If yes, how did the piano lessons positively influence the child

ADDENDUM Q: PARENTAL CONCERNS QUESTIONNAIRE

Parental Concerns Questionnaire

This Questionnaire is designed to take less than 15 minutes. It can be done by telephone interview or sent to parents in the mail. It asks 15 basic questions about a young child's development which may put him/her at risk for behavior problems later. If the child is at risk, he/she will be invited to the Centro Ann Sullivan del Peru for further in-depth evaluation.

	YES	NO
1. Is your child usually happy? If no, is he/she sad ____, anxious ____, upset____ ?	___	___
2. Are you concerned about your child's motor development? If yes, can he/she roll over___, sit____, stand____ walk___ run___?	___	___
3. Does your child have a genetic syndrome? If yes, what_____ ?	___	___
4. Does your child have a neurological syndrome? If yes, what_____ _?	___	___
5. Has your child ever had a seizure?	___	___
6. Are you concerned about your child's learning abilities? If yes, a little___, somewhat___, very___	___	___
7. Does your child have problems with attending to others?	___	___
with communicating to others?	___	___
with unusual repetitive behaviors?	___	___
8. Are you concerned about your child's language development?	___	___
9. Are you concerned about your child's repeatedly hitting others?	___	___
10. Are you concerned about your child's repeatedly destroying objects?	___	___
11. Does your child purposely and repeatedly injure himself, e.g. head-bang, bite-self, scratch-self, pull his/her hair?	___	___
12. Does your child make funny movements, e.g. body rocking, hand waving, head-weaving?	___	___
13. Are you concerned that your child may have autism?	___	___
14. Does your child have a sibling with autism?	___	___
15. Do you have any other concerns about your child's development?	___	___

ADDENDUM R: SEMI-STRUCTURED INTERVIEW

Date: _____ Child's name:_____

1) Did you find any changes in your child's behaviour during the week?

Yes

No If yes, how did his/her behaviour change?

_____

_____

2) How does he/she respond when coming to a piano lesson?

_____ _____

_____

_____

3) Does the child repeat (echo) what he/she learned during the piano lesson, at home?

_____

_____

4) Does the child imitate hand movements, learned in the piano lesson, at home? (For example 'stone on the mountain', which is used for the correct hand position)

_____

_____

5) Does the child practice piano on their own at home?

Yes

No