Investigating the value of a computer game as introduction to piano learning for developing sight-reading skills in beginner piano students

By

Ilse Myburgh

A research report in partial fulfilment of the degree

Masters in Music

(Performing Arts)

Student number: 338293

University of the Witwatersrand

Supervisor: Dr. Aletta J van As

2012

Abstract

Investigating the value of a computer game as introduction to piano learning for developing sight-reading skills in beginner piano students

This exploratory research project investigated the multifarious effects of incorporating computer music software in the form of a computer game into beginner piano lessons. The design and implementation of an animated computer game, designed by the researcher for the purpose of the study was used to assist young beginner pianists master the layout of the piano keyboard in relation to a score with basic music notation. A detailed description of the game is included. Contributing elements central to knowing, understanding and applying the layout of the piano keyboard when sight-reading were also investigated. A pilot study which formed the basis and point of departure for the study is discussed in detail; the findings of which conclude the report. The results of a case study conducted on two control and experiment groups aged three to six, which involved the use of the specially designed computer game to teach beginner piano students the keyboard layout and introductory notation in the form of an interactive story, is recorded. Through narrative enquiry, a series of interviews with world renowned pianists and piano teachers on the value and importance of sight-reading is expounded. The researcher's personal reflections on the entire project as well as her own personal philosophy with regard to basic piano tuition, the continued enculturation and propagation of new beginners and sight-teaching are included.

Keywords

Computer games

Web-based learning

Piano tuition programmes

Piano-didactics

Sight-reading

E-learning

Acknowledgements

I would like to thank:

My supervisor, Dr Aletta J van As, for her sensible advice, her efficiency and assistance not only with regard to the writing of the thesis but also for supporting me during my time of research.

Mrs Paula V. Berry, Mrs Jane-Anne Buisson-Street, Mr Antony P. Cohen and Mr Rob Matthews for revision of grammar and style.

Mrs Jane-Anne Buisson-Street, for opening my eyes to the endless possibilities of incorporating IT in my workplace.

My father for his "Strive to be the best at what you want to be!"

My first promoter, Dr Christine Lucia saying: "Never stop researching the possibilities in piano didactics."

I dedicate this research report to Mr Malcolm Nay a great mentor and teacher.

St John's College for financially supporting me in my research and studies.

The Berry family.

Bedankings

My Skepper, wat my elke dag dra en seën met wonderlike kinders wat my lewe vul met leergierige ogies.

Vir my Ma wat vir jare lank haar filosofie en wysheid as Wiskunde onderwyser met my gedeel het en as ouer my met liefde, raad en wysheid omvou het.

My jarelange mentor, Prof. Joseph Stanford vir sy volgehoue aanmoediging en ondersteuning, entoesiastiese benadering en vorming van my as jong pianis. Vir die navorsingswaardige voorbeeld, sy geduldige oor en tyd vir al die vrae wat ek ooit wou vra.

Vir die voorreg om onder wonderlike onderwysers onderrig te word en ook die kennismaking van ons land se voorste onderwysers wat my deurgaans geïnspireer en gevorm het, met spesiale verwysing na Mev Peggy Haddon-Richardson, Mev Claudine van Breda en Mev Pauline Nossel.

My kollegas in die verlede en hede, met 'n spesiale verwysing na my direkteur van musiek aan die St. John's College, Dr Ben Oosthuizen vir sy volgehoue geloof in my as jong onderwyser en sy inspirerende leiding.

Mr Tom Varghese, IT spesialis en raad met die uitleg van my rekenaar leermateriaal.

Abbreviations

CD	Compact Disc
CD-ROM	Compact Disc – Read Only Memory
DVD	Digital Versatile Display
Eds	editors
edn	edition
n.d.	no date
vs	versus
www	world wide web
e.g.	example
UNISA	University of South Africa

Table of Contents

Chapter 1   Introduction

For the last eleven years I have worked as the Head of Piano at St John's College, an independent school[1] situated in Johannesburg (Gauteng province, South Africa), where I have taught children of various age groups from four years upwards. The preschool music programme at St John's College incorporates music learning into the daily classroom routine. Consequently music becomes an essential part of the preschool's core integrated curriculum. It is in the best interest of the institution's music department to win these young students' interest in piano learning. In my seventeen years of teaching experience I have found that it is crucial that piano students know the layout of the piano keyboard before reading any notes. When students fully know and understand layout of the piano keyboard, they then have greater confidence in their sight-reading. This in turn allows them to concentrate better on reading notes and their eye movements are more inclined to stay on the book.

My first experience of teaching a preschool piano student (aged four) was in 2000. Clearly intelligent and particularly energetic, the student refused to sit on the piano stool. Instead, he insisted on playing with his toys on the floor in front of the piano. Having at that stage no experience of teaching preschoolers, I resorted to what I believed might work for a young beginner. In a typical lesson, we would sing well known folk songs. I would play short piano pieces to create curiosity or a cursory interest. I would try to use the colourful pictures in beginner piano books such as John Thompson's "*First Piano Lessons*" and Ann Bryant's *"Keyclub: Book One",* to arouse interest in working with a piano book. This approach failed dismally. I then tried to incorporate colouring in the pictures accompanying lessons in the various beginner books, but the student remained disinterested.

---

[1] The *South African Schools Act* (SASA) of 1996 established a national schooling system and recognised two categories of schools: public and independent. Public schools are state controlled and independent schools are privately governed.

After three months of lessons, I concluded that lessons were not successful and that the student was possibly too young to assume the necessary discipline required to learn how to play the piano. When advising the parents of my summation, their candid response was simply that as a teacher it was my professional responsibility to pursue alternative avenues which promoted and ensured learning. They suggested a revision of my own teaching philosophies and requested that I attempt to teach the student at least one song which could be performed for his grandmother in the following six months.

As a last resort I decided to incorporate storytelling in teaching the student the piano. Reshaped by a teaching philosophy that beginners should have a thorough knowledge and understanding of the layout of the piano keyboard to be sufficiently prepared to begin to read music and thus play the piano. My new approach made use of storytelling to teach the piano keyboard, specifically C to C (one octave). The success of this seemingly naïve strategy took me by surprise; it impacted my teaching method and reshaped my teaching philosophies. The success of this story adequately aroused and sustained the child's attention.

When I commenced teaching at St John's College, it was soon apparent that most preschool learners had access to computers at home. However, very few students at home had access to music instruments, specifically the piano. The idea of introducing the piano to beginner students through a computer music game based on a simple story was conceived.

In answering the challenge of getting young students interested in the piano, I designed a computer music game, which was then implemented by a group of fourth year Information Engineering students from the University of Witwatersrand: I was approached by the Information Engineering Department of the University of the Witwatersrand, who were looking for themes and clients for their final year software engineering students. Each group of two or three students were required to design and implement fit-for-purpose software for a client as the final submission that fulfils

their degree requirements. Therefore I submitted my concept of "the story" and asked them to design a suitable software programme (in the form of a computer game) that would animate "the story". The computer game teaches the typography of the piano keyboard. In this study the typography of the piano keyboard will be termed as the layout of the piano keyboard.

The software was then tested on a group of beginner students: Two small groups, of twenty-three children each (aged three to six) with similarity of social and educational backgrounds. The outcome was overwhelmingly positive and will be discussed in Chapter 4. Thus an explorative, technologically - driven and integrated - approach to elementary music concepts with a specific focus of my personal piano didactics and sight-reading, was born.

1.1 Aim

From its inception, the nature of this study dictated a two-fold aim. The primary aim was to determine the extent to which a computer music game, which was initiated by the researcher, was able to introduce the layout of the piano keyboard to novice pianists of preschool age, thus laying the foundation for good sight-reading skills. The secondary aim was to account for the value and extent to which such a computer music game could spur a wider interest in learning to play the piano or commencing with traditional piano tuition at St John's College.

Subject matter related to the aim of the research includes:
- An understanding of what constitutes good sight-reading;
- The significance of sight-reading competence for piano learning;
- E-learning; and
- How preschool children learn.

Establishing a conception of the above will aid in the primary aim of this research project namely to investigate a specially developed computer game to heighten the young piano beginner's interest in piano studies at St John's while simultaneously

sufficiently familiarising them with the piano's keyboard to promote sight-reading development.

1.2   Purpose of the study

The primary purpose of the study is to investigate if, and to what extent a computer music game introducing young children to the layout of the piano keyboard can advance their sight-reading ability.

1.3   Rationale

In my experience as a piano teacher I have come to the conclusion that sight-reading is one of the most important aspects of piano playing, which we encounter in our everyday music making lives - as both musicians and teachers. Poor sight-reading largely stems from poor teaching and/or learning in the early stages of keyboard training. Sight-reading opens up a greater level of repertoire, style and music appreciation. Not knowing the layout of the keyboard will affect one's reading of even the simplest music. Often because students lack confidence in their sight-reading ability they falter in letting their fingers find their own way along the keys without the aid of their eyes.

Teaching through association is a powerful tool to equip students with an adequate understanding of how one operates the keyboard and physically implements music notation. If the layout of the piano keyboard is introduced through the repetition of various visual images, the association will assist the student to read the notes. While most beginner piano books commence tuition on middle C as *doh,* the computer music game developed for the study begins a step before that with the familiarisation of the layout of the piano keyboard. The game thus assists the teacher in introducing the instrument to the student and sufficiently scaffolds learning to a point where the teacher can easily include sight-reading activities.

The technique of playing and reading simultaneously is a demanding process and must be monitored carefully in the beginning stages of piano learning. Alarming concern should arise over students' lack of sight-reading ability and must be combated early on in the student's learning journey. Renowned twentieth century composer and music educator Zoltan Kodály believed that high quality music learning must begin as early as possible in a child's life. He advocated that a child's musical education should commence nine months before the birth of the mother[2] (Trinka n.d.: 1).

Focus falls on early childhood development because of the age range of the students involved in the study (preschool: three and four years old). When one considers the number of physiological processes involved in reading at sight, the use of technology in the form of computer software as tool to consolidate some of these processes could at least be considered. The computer music game developed for this study could also be used as a tool for assess young piano students' knowledge of the piano keyboard and note names.

In my capacity as Head of the Piano Department at St John's College, I have the advantage of teaching students across both the Junior and Senior schools. In pursuing various avenues to boost piano, an early and emphasised focus on preschooler sight-reading is recognised as an expansion strategy for the future. The implementation of learning programmes at an elementary and or preschool level is therefore imperative.

---

[2] Kodály's statement implies that parenthood does not begin with the birth of one's children. It begins before parenthood during the individuals own personal development and education.

1.4   Research problem

In my experience over many years of piano teaching I have found that few piano students have adequate sight-reading skills. Poor sight-reading can be traced from poor understanding of traditional teaching methods in the early stages of keyboard training. One cannot stress to teachers enough, the importance of really coming to grips with the problem of the piano keyboard layout. In my own teaching, I identified the need for a computer music game for young preschoolers to serve as introduction to the layout of the piano keyboard. This computer music game needed to be uncomplicated, fun-filled and succeed in helping young children remember the layout of the piano keyboard to assist in laying the foundation of good sight-reading skills. The computer music game needed to be designed, developed and implemented. Finally, the effect of the game on both the young beginners' understanding of the layout of the piano keyboard and their interest in commencing with piano learning needed to be evaluated.

1.5   Research questions

The main, critical research question for this study is:

To what extent can a computer music game assist preschool children in understanding the keyboard layout of the piano before commencing the initial piano lesson?

The following sub-questions function to embellish the critical research question:

1.   To what extent can the proposed game influence the future sight-reading development of preschool beginner piano students?

2.   What are the factors assisting or hindering good sight-reading in pianists?

3.   Is E-learning (as in the case of the computer music game) a viable strategy for piano teaching and learning?

4.   How do preschool children learn?

1.6 Research methodology

Due to the nature of this study, the researcher will focus mainly on qualitative research methods. In qualitative research, one should make use of all of the aspects of our humanity (Weiten 2001: 174). Not much has been written on creating and incorporating a music game as introduction to piano learning. Cresswell (2009: 26) notes:

> One of the chief reasons for inducting a qualitative study is that the study is exploratory. This usually means that not much has been written on the topic or the population being studied, and the researcher seeks to listen to participants and build an understanding based on what is heard.

Qualitative research according to Smith (1983: 7) is:

> … exploring what is going on in a situation, group or event, etc. It seeks to describe, to understand from the participant's point of view and to explain phenomena, situations, group dynamics and relationships. It uses words rather than numbers.

1.6.1 Methods for data collection

In this study, qualitative data has been collected and is described in four ways: narrative enquiry, literary review and case studies. Because the researcher uses the observations and perceptions of her own teaching experience the study takes the form of an action research project.

- **Action research**

The researcher identifies with Kemmis and McTaggart (1992: 5) who define action research as the following:

> Action research is a form of collective self-reflective inquiry undertaken by participants in social situations in order to improve the rationality and justice of their own social or educational practices, as well as their understanding of these practices and the situations in which these practices are carried out… The approach is only action research when it is collaborative, though it is important to realise that the action research of the group is achieved through the critically examined action of individual group members.

It must be noted that action research is not simply problem-solving; it also involves problem-posing. It is motivated by a quest to improve and understand the world by changing it and learning how to improve it from the effects of the changes made (Cohen & Manion 2000: 227). This study is a form of collective self-reflective inquiry in that it documents the responses of the students who used the computer music game to facilitate their learning. In the instance of this study, the exposure and then teaching as well the evaluation of the computer music game served to challenge the rationality and justification of my own educational practices as well as my own understanding of the piano didactics and general piano pedagogy.

Figure 1: Action research process

Borrowed from ProDAIT (Professional Development for Academics Involved in Teaching)

The first plan to address the posed problem (assisting young beginner piano students' in learning the layout of the piano keyboard), was to devise a storyline to introduce the octave C to C on the keyboard. This introductory story became part of my teaching strategy with young beginners ("Act"). More information about my observations of and reflections on the effects of the introductory story is provided in Chapter 3 (The Game). This research project presented an opportunity to re-plan the application of the introductory story and develop it into a computer music game (described in Chapter 3). Observations and reflections of the effect of The Game are discussed in Chapter 4.

This research report is a form of collective self-reflective enquiry in that it documents the responses of the students who used the game to facilitate their learning. In the instance of this study, the exposure and then teaching as well the evaluation of the game served to challenge the rationality and justification of my own educational practices as well as my own understanding of the piano didactics and general piano pedagogy.

The research is validated in its authenticity through the critically examined actions of not only those who participated in the study but also the responses of the parents of the two selected schools and their own individual insight and critique of the effectiveness of using the computer music game to facilitate the teaching and learning of the piano keyboard.

- **Narrative enquiry**

The findings of the research process within this study have been communicated through narratives. These are my reflections as the teacher of the individuals participating in the experiment of the music computer game. Their responses are documented through quotations of the students and parents involved with the actual delivery or teaching and use of the game.

- **Literature review**

In Chapter 2 the literature review (supported by interviews and a personal reflection) aims to define and describe subject matter related to the main research question and sub-questions of this study, namely E-learning and piano sight-reading and that forms the foundation of the study. However, it must be noted that literature in the field of piano didactics appears to be vast and quite extensive, especially when specifically compared to the literature supporting software incorporated into teaching piano didactics. Because resources on electronic learning in the field of piano didactics appear to be scarce, a literature review focusing primarily on altered pedagogies relating to the layout of the piano keyboard, piano didactics and sight-reading through the use of technology in the form of electronic software forms the

foundation for Chapter 2 of this study. I have relied heavily on various beginner piano series' as well as the extensive use of the internet as resource related to educational software programmes. Further, the four best selling beginner piano tutor books in South Africa are compared.

In this chapter (or the literature review) a secondary focus is placed on the physiological and then the musical development of children in the typical age category of preschoolers. The musical development of children in the typical age category of students in the study is based on the musical development of children as outlined by Swanwick (1994).

- **Case studies**

According to Opie (2005: 74), a case study can be viewed as an in-depth study of inter-actions of a single instance in an enclosed system. The issue of numbers for a case study is therefore meaningless. It could involve a single person, a group of people within a setting, a whole class, a department within a school or a school. The focus of a case-study is on a real situation, with real people in an environment often familiar to the researcher. Its aim is to provide a picture of a certain feature of social behaviour or activity in a particular setting and the factors influencing this situation.

The case studies used to augment this study aim primarily to gather the observations and perceptions of the teacher (myself) who used the computer music game to teach keyboard layout to individual preschool children in two groups. Data gathered from each case-study has been analysed to glean from it the responses of the individuals affiliated to either group in regard to the game. An in-depth description of each case study will be covered in Chapters 4 and 5 of this study.

The brief outline that follows assists the reader with necessary information concerning both case studies. The computer music game was introduced to students aged between three and six. Two working groups, of twenty-three children per group

were selected. The groups consisted of members in nominally different age groups (a mean of three and four years old) with similar race, gender and social histories to make a clear analysis of the impact of such a programme over a wide spectrum. The academic content of the computer music game lesson delivered by the teacher over a series of lessons to both case-study groups was identical. The computer music game included a testing stage for each student playing it. At the end of each lesson the teacher assisted the students with revision of concepts and knowledge taught so as to concretise and consolidate the learning.

1.7 Theoretical framework

The process of bridging the theoretical and practical frameworks of the study provides the most insight into the research project. The outcome of creating and implementing a computer music game; setting up the case study experiments and gathering information to investigate the possibilities, influences and educational outcomes of such an experiment is discussed in Chapter 5. Theories emanating from varying academic disciplines in regard to teaching and learning in the first stage of the development phase of beginner pianists, such as laying a solid foundation to develop good sight-reading, frame the outcome of the study. Research tools included:

- Test criteria; thus, students answering the challenges of the computer game or tasks given by the teacher;
- Observation of task completion given by the teacher or via the computer game; and
- Measurement of progress whether via the piano or the computer game, with specific reference to keyboard knowledge of the piano.

The use of technology as a compositional tool in music has been around for some time but the role and use of technology with specific regard to practical piano tuition appears to be relatively new and unchartered. The possible educational value and multifarious possibilities arising from the implementation and use of an electronic music education game which serve to support and enhance elementary music tuition

is most welcome and warranted. Learning through computers should be considered to supplement the approach to piano didactics.

The co-development of the electronic music education game authored and designed by the researcher with the assistance of final year information engineering and graphics students from the University of the Witwatersrand was an interesting and noteworthy experience. The researcher will discuss the processes involved in creating the computer music game from inception to implementation in Chapter 3. With the help of the Information Engineering and Graphics department this computer music game was developed to give children the opportunity to learn the first seven letters of the music alphabet without the use of a piano keyboard. Through colour association the piano keyboard layout is made more accessible and memorable. The notation or symbol of the specific note and pitch are incidentally introduced while playing the game. The interpretation of the computer music game testing is commensurate with a computer laboratory setting at the Bridge Nursery School as well as the researchers own piano studio. The computer music game's content will be further discussed in detail in Chapter 3.

1.8   Significance of this study

Should the outcome of this investigation indicate that the computer music game (hereafter "the game") had a positive influence on the sight-reading abilities of the participating young beginner piano students, this could then signify possibilities for the further design, development of computer games and incorporation of more piano teaching in computer games. Such games could be used to address various challenges in piano teaching, opportunity to do revision and learning.

1.9 Chapter classification

Chapter 1   Introduction

Chapter 2   E-learning, Sight-Reading And Young Piano Beginners

Chapter 3   The Game

Chapter 4   The Case Study

Chapter 5   Conclusion

Bibliography

Chapter 2   E-learning, Sight-Reading And Young Piano Beginners

The title of this research report is: "The use of a computer game as an introduction to piano sight-reading skills in young beginner students". Through literature review, personal reflection and interviews, this chapter examines the three main concepts in the title, namely E-learning, sight-reading and the learning of young children.

2.1   E-learning

> Why would we want to limit a kid's computer time? The computer is, without question, the single most important tool of modern society. Our limiting kids' computer time would be like hunter-gatherer adults limiting their kids' bow-and-arrow time. Children come into the world designed to look around and figure out what they need to know in order to make it in the culture into which they are born. They are much better at that than adults are.
>
>   - Peter Gray[3]

The first section of this chapter (E-learning) is divided into five sub-sections focusing on the questions highlighted below:

      2.1.1   What is E-learning?

      2.1.2   Why E-learning?

      2.1.3   Computer games and young piano beginners.

      2.1.4   Other available E-learning piano tuition programmes: A critique.

      2.1.5   Web-based learning as a supplement for music teachers.

---

[3] Available: http://www.psychologytoday.com/blog/freedom-learn/201201/the-many-benefits-kids-playing-video-games [2012, August 13].

2.1.1   What is E-learning?

E-learning according to *Cognitive Design Solutions* (2005: 1) literally means "electronic learning". Electronic learning takes place through a wide range of applications and processes designed to deliver instruction through electronic means. The phrase "E-Learning" implies that learning takes place through the World Wide Web, however, it also includes CD-ROM and/or video-conferencing or communication through satellite transmission. E-learning is vital to the day and age we live in because it signals a paradigm shift in the concept of education and training.

The following (adapted from *Cognitive Design Solutions*, 2005: 1) is a summary of E-Learning modalities currently in use:

- Use of technology to enrich classroom/workplace learning (Internet, CD-ROM, interactive multimedia, games/simulations and social networks);
- Online instruction for distance learning;
- Blended instruction (combining online and face-to-face learning events);
- Synchronous: real-time instructor or self-led single and/or multiple students;
- Asynchronous: student/s and instructor have intermittent interaction;
- Instructor-led group work (combining both synchronous and asynchronous learning sessions);
- Self-study (online tutorials, staged computer games (with a spiral development of concepts which must be attained in each stage before progressing) research and discovery learning events;
- Self-study with subject matter expert (tutoring, mentoring, coaching);
- Web-based tutorials (individual or group using self-paced online resources);
- Computer-based tutorials (individual or group using CD-ROM resources); and
- Video and audio resources (distributed by tape, CD, DVD, online streaming, download, and/or pod-cast, etc.).

E-learning has many facets because it encompasses technology-based learning. For the purpose of this report, I will focus on a minute element of software based

learning, namely the possible incorporation of a computer game as a tool to introduce (and revise) the layout of the piano keyboard.

2.1.2 Why E-learning?

We live in an age of computers. Learners use computers from an early age for various projects and activities both at home and at school. At home, the tempo of these activities is driven by the child's individual developmental pace. Activities include playing various games as well as for older children communicating through various social networks via the internet like Facebook and Twitter. Since man-machine interfaces (such as computer keyboards) already exist and can easily be projected onto a surface such as a desktop or wall, there is little reason why the traditional piano keyboard cannot be used in a similar way.

During my early years as a novice teacher, computers were not used in everyday piano tuition as an instructional aide and/or educational device. Today, however, more and more educators and researchers recognise the potential of computers and particularly video games as a tool to engage learners in multi-sensory, complex learning processes (Parks 2008: 235). Brown (2007: 3) states:

> Writing computer software to enable learning is much like any educational resource design. It turns concepts about the learning experience into a concrete activity that can be applied and tested.

Posing the challenge of incorporating computer games is discussed later in this chapter (please see 2.1.3). As there is a lack of personal interaction between teacher and student when computer games are used, teachers must become aware of the fact that the student will need guidance in an asynchronous learning environment.

If current trends are anything to go by, computer games are more popular than ever and young children are willing to devote considerable amounts of their time playing

computer games. Whilst playing, a child learns through experimentation and this vital skill facilitates not only the child's conceptual development but also his/her knowledge of the world.

There is sufficient evidence to demonstrate the effectiveness of technology which improves student achievement (Royer 2012: 233). Ricci et al., (1996: 305) identify six benefits of 'computer-based gaming', namely active participation, immediate feedback, dynamic interaction, competition, novelty and goal direction. De Aguilera and Méndiz (2003: 11-12) discuss a range of benefits of playing computer games for children, which include:

- Logical thinking: video games help in thinking about how to solve problems: Due to the number of elements on the screen, and the resulting need for visual and spatial discrimination, the ability to observe is constantly used during game playing; and
- Spatiality and geography: the development of skills to interpret special representations (symbols) like maps.

Saltzman (2006: 1) cites the work of Ben Sawyer (n.d.), co-founder and director of the "Games for Health Project" - an organisation that brings together medical professionals, researchers and game-makers to explore new ways to improve health care practice and policy who states that:

- Gaming is a clear case of learning by doing;
- Gaming has the capacity to teach us that problems are multifaceted; and
- Games can sharpen the memory and improve hand-eye coordination.

It became clear in this study that when it comes to designing a computer game to enhance piano tuition, the design engineer will have to be fully guided by and reliant on the specialist understanding and insight of the piano pedagogue.

2.1.3   Computer games and young piano beginners

Making use of computer games in teaching and learning is more and more popular. Games such as "Where in the World is Carmen San Diego?" is a good example of this. Games, using an instructional approach allow children to progress at their own pace. Because video games can hold students' attention by keeping them actively engaged, they have real potential as a next generation learning tool; however, if the games are not of a high standard their effect will have little meaning and learning will be lost. Swanwick (1999: 7) discusses how music needs more than mere intellectual engagement: it must encompass expectation and surprise and it must relate to our own lives:

> Music has once again been removed from life, turned into a kind of game, if of an intellectual kind. It seems more likely that expectation and surprise are part of the mechanism of engagement with the work. It is how we are kept interested and involved is how we are brought into action with prediction, speculation and ideas about what is happening and what is likely to happen, and in all this there is obviously likely to be a trace of excitement … [A music work must relate] strongly to the structures of our own individual experience, when it calls for a new way or organising the schemata, or traces of previous life events.

The music computer game designed and developed for this study makes use of elements of expectation and surprise and allows for prediction and speculation of what is going to happen. Every character and setting in the game created for and investigated in this research are designed to resound with the child's previous life events.

As is mentioned in Chapter 1, final year information engineering students, of the University of the Witwatersrand helped developed my concept. To achieve this I assumed the role of software engineering student-team's client. The writing of the

music computer game introduced in this study was overseen by Pippa Tshabalala[4]. During the design phase the following was identified:

- The majority of the young students I work with have access to computers but not music instruments;
- Computers afford opportunities for learning both at home (without the teacher) and during lessons with the teacher;
- Software provides visual and auditory stimulation which maintained the child's focus in the tasks presented;
- A well planned educational game employs interactive participation of the student, which is conducive to learning;
- Students can control their own pace of study when engaging with tasks;
- Hand-eye coordination (in this case the ability to direct the pointing device, e.g. the computer mouse based on visual and aural stimuli without looking away from the computer screen) is developed; and
- The game can be played with a friend or in a group environment, which allows for the creation of a more sociable environment accommodating and encouraging peer learning.

It is true that piano playing involves far more complicated processes than using a computer mouse. However, if the possibility exists that playing computer games could promote the habit of keeping one's eyes on the written notes when reading at the piano, as well as enhancing theoretical music knowledge such as note names is worth pursuing.

---

[4] Tshabalala (formerly a lecturer in Animation and Video Game Studies in Digital Arts at the University of the Witwatersrand) has designed and facilitated numerous courses for students to design computer games that not only entertain, but also educate the players. Motivated by her belief in the value of educational computer games, Tshabalala currently presents "The Verge" - a programme on national television (aired on DSTV 2008-2012) which introduces computer software programmes that are available on the market to viewers in the comfort of their homes. By making use of this public forum, parents and mentors can see that claims that computer games are inevitably "bad for children" are not necessarily true. Platforms like "the Verge" give broad insight into what is available on the market in the form of education based software and to what extent such games can serve as an educational tool.

Most if not all learners participating in this research project had computers at home. The same cannot be said of pianos. Hill (2005: 3) argues that:

> New ways of building on the skills and interest from home emerged when teachers engaged some children as coaches and mentors in the classroom and capitalised on children's fund of knowledge by using similar software in school as at home.

As a teacher working in an environment where parents of piano students are in a higher financial income bracket, it is my personal observation that many parents of preschoolers at St. John's College first seem to invest in a computer for their child before considering buying a musical instrument. I believe that many of these parents believe that E-learning may be a cheaper training method. It may however, be a terrible pitfall. I proffer here that both (music instruments and computers) should be used hand-in-hand to facilitate teaching and learning. Teachers who ignore technology altogether may halter the many benefits and positive impact E-Learning could bring to the student and the teacher for that matter. In an essay edited by Peter Lunenfield (1999: 19), entitled "The Digital Dialectic" he states:

> The digital dialectic goes beyond examining what is happening to our visual and intellectual cultures as the computer recodes technologies, media and the art forms, it grounds the insights of theory in the constraints of practice.

One cannot assume that computer training will control and impact all students in the same way. Logic dictates that different students will show different abilities when applying learned knowledge. For the purpose of this study, I therefore investigated several software programmes already on the market and then evaluated and discussed how they contributed to the learning and teaching of piano with specific regard to curriculum.

2.1.4 Other available E-learning piano tuition programmes: A critique

Numerous piano tutoring programmes are available and easily accessible on the internet. The following is a critique of five E-learning piano programmes currently available on the web.

Programme 1: *Learn to play the piano: A beginner's guide.*

(http://www.youtube.com/watch?v=3unOs7Oekjo)

This software programme is available on YouTube with a narrator guiding the listener towards the layout of the piano keyboard. No clear structure is given to where 'middle C' is on the keyboard and how to find it amongst the other 87 keys. If the listener is a young child the information will have little if not any relevance and learning will be done by muscle memory or chord progression. Because the programme moves quickly from piano keyboard layout to hand functioning, the piano student will struggle with lateral coordination.

Young students may need slower guidance when relating key names to note names. From practical teaching experience of young beginners complex chord playing is not yet an option for the very young student. This programme will not be applicable to the very young piano student. It may, however, relate to the older beginner because of the speed of the content and the physical demands of the programme content.

Programme 2: *Free online piano lessons by Zebra keys*

(http://www.youtube.com/user/zebrakeysonline)

These lessons are arranged sequentially as follows:

1.   Patterns of the black and white Keys;

2.   Names of white keys;

3.   Names of black keys;

4.   Grand Staff: diagram of the piano keyboard; and

5.   Note durations.

The programme gives a good layout of the piano keyboard. One concept per lesson is favourable with younger piano students (thus different ages can benefit from this structure of lesson times). A B C D E F G notes are introduced, with C associated with *doh*. Naming of keys is given with clear instructions.

Children who do not know the alphabet may struggle with this style of presentation because the speed of introducing the concepts in each lesson is demanding as is the sequence of alphabetic instruction. However, revision takes place by repeating the programmes playtime. Application does not allow time for implementing the given information. By the end of the first lesson the student must achieve the notes, C E F B, therefore recognising the grouping of the black keys. No concept of sight-reading has been introduced at this point yet. (End of lesson 2). By the third lesson, the pianist will be introduced to the reading of notes. Lesson 5 gives an introduction to rhythm, initiating the left-hand chord performance of primary chords in the sequence of I, IV and V. This approach may be too advanced for a young beginner due to speed at which the lesson content is being introduced.

Programme 3: *Go Piano: Free On-Line Piano Lessons*

(www.gopiano.com)

The lessons in this series take the form of audio lessons. No clear visual instructions are given. The lack of supplementary sensory input may translate into a higher degree of difficulty in understanding the concepts incorporated and conveyed if application of the technology to the target age group is taken into consideration. This programme, however, has well constructed quiz tests to give the learner the opportunity to do revision.

Programme 4: *Nintendo-Wii*

Nintendo-Wii is a home entertainment system that relies on wireless technology with built in motion sensors that translate movement directly onto a television screen. Through game playing, the student can gain a true sense akin to performing on the piano. The mastering of the instrument itself and theoretical knowledge needed to acquire the mandatory skills of playing notes in sequence or according to the written score, however, is not included.

Programme 5: *www.softmozart.com*

Softmozart is an education programme currently available to promote music literacy globally. The design of the computer games offered is comprehensively based for stimulation of a wide age range of children from the age of two years old. The software programme of the piano curriculum introduces repertoire to the piano students, by correlating the notation on the staff to the layout of the piano keyboard by showing the piano student the layout of the keyboard while play the notes simultaneously. The notes are not written as traditionally with the treble clef at the top of the page and the bass clef at the bottom. The right hand reads the clef vertically to the bass clef so that the student can coordinate the hands on the keyboard while reading the chord. The music does not read from left to right but moves vertically over the computer screen to help the piano students coordinate the score to have a precise view of what he or she needs to perform.

2.1.5   Web-based learning as a supplement for the music teacher

Replacement of a musical instrument in the students' musical journey is neither suggested nor intended in this research. Starting as a music teacher in 1995, I did not incorporate a computer into any of my piano students' lessons. Royer (2012: 233) investigates this approach stating:

> Why are our teachers still hesitant to use technology for teaching and learning? One reason for the lag in implementation is that teachers are not yet convinced that

computer technology can significantly enhance learning. When teachers believe in a method, they go to great lengths to implement it. Almost everyone can tell a story of a dedicated teacher who created the most sensational lesson from materials that he or she obtained by saving soup labels or cash register receipts, or a story of a teacher who spends hundreds of dollars every year on classroom supplies. The point is that teachers will stop at nothing if they believe in the cause. However, many teachers do not yet believe in the benefits of computer technology in the classroom.

Because this research report explores the impact software has on self-study methods when learning the layout of the piano keyboard, I became aware of the challenges of incorporating software programmes into piano teaching. I have found only a few options that are currently available on the market that fit the needs of children in the three to six age groups. I will investigate the impact that computer based learning has on teachers in Chapter 4.

As part of the St. John's Pre-preparatory school's music curriculum, I propose this form of early E-learning because it will give our learners much needed exposure to keyboard orientation and early sound stimuli. Larrivee (2000: 294) states:

> When teachers become reflective practitioners, they move beyond a knowledge base of discrete skills to a stage where they integrate and modify skills to fit specific contexts, and eventually, to a point where the skills are internalised enabling them to invent new strategies. They develop the necessary sense of self-efficacy to create personal solutions to problems.

I believe that teachers who ignore technology altogether may halter the many benefits and positive impact E-Learning could bring to the student and the teacher for that matter.

2.2   Sight-reading

I would teach children music, physics, and philosophy; but most importantly music, for the patterns in music and all the arts are the keys to learning.

- Plato[5]

The subject of sight-reading and the challenges it poses for youngsters is an area very close to my heart. My personal method of piano introduction is to first teach piano students to read and then to play. Based on my experience I would like to point out certain factors that well trained teachers should take into account when approaching piano students with the concept of sight-reading: knowledge of the piano keyboard layout is just the beginning of the journey to successful sight-reading. In fact, it is my opinion that knowledge of piano keyboard is a contributing factor to good reading ability. This research report focuses mainly on this aspect, although, logic dictates that other elements are also required in developing good sight-reading. Some of these are:

- Rhythmic conceptualisation;
- Good eye movement;
- Knowledge of theory;
- The individual function of the right and left hand;
- The reading of the treble and bass clef; and
- Reading hands together.

---

[5] Available: http://www.brainyquote.com/quotes/authors/p/plato.html [2012, November 23].

Fourie (2004: 1), a retired professor from the University of Pretoria and renowned piano teacher defines sight-reading as follows:

> Cognitive research reveals an intricate system of neural networks spread over all four cortical lobes of the brain, which are involved in processing musical sound and notation in particular. When sight-reading a piece of music that is seen for the first time there are no context-specific memory maps to depend on, as is the case of performance study. Specific challenges include dealing with pitch and rhythm separately while maintaining structural coherence, developing the ability … 'inner hearing', and coping with stress caused by high levels of mental arousal. These problems can be overcome if sight-readers develop an awareness of mental processes that underlie their actions at the keyboard, and if they strengthen both the analytical and holistic strategies of the brain.

The above clearly indicates that good sight-reading is no small accomplishment. The view expressed by Fourie, links one of the fundamental aims of this research namely investigating technological media to enhance sight-reading skills at a young age.

2.2.1 What is good sight-reading?

Sight-reading is the most important aspect of piano playing in our everyday music making. It is a functional skill that is essential for all musicians involved in various fields of western classical music cultures and traditions.

Using my experience as a piano teacher and proficient pianist, I raise the following questions:

1. Which skill, crucial to being a good pianist, have I found lacking in young pianists?
2. Which skill, if lacking impacts negatively on the development of pianists?
3. Which skill, if taught successfully could impact positively on the development of pianists?

The answer to all three questions is indisputably good sight-reading.

Zoltan Kodály, a famous twentieth century Hungarian composer, ethnomusicologist, pedagogue, linguist and philosopher, firmly believed in the importance of music literacy (music reading) for every child (Swanwick 1988: 11). Kodály, convinced that every child should first learn to read, claims that millions are condemned to musical illiteracy, thus falling prey to the poorest of music.

Music teachers need to find a process of linguistic formation. The child will understand the music notation better if they can relate it to the keyboard. The importance of tactile memory of the keyboard will simultaneously develop a child's sight-reading if he or she knows where the written score is placed on the keyboard. Fourie (2004: 1) in noting the complexity of sight-reading skills says that the eye can only analyse that which the mind has grasped to become part of conscious thought. The student starting piano lessons may be overwhelmed by vast amounts of information that he or she needs to remember when starting to play the piano. However, it is the developing of the brain in recalling every individual aspect of that information within a specific time frame that ultimately leads to fluidity and correct playing by sight.

In his/her first encounter with written music, a child enters a world where every symbol represents a different sound or action. Curwen (1913: 8-9) notes that not only are these symbols a list of commands, but also "a means of expression". When the music student needs to give a true reflection of the printed material, he or she must clearly understand the concepts of pitch, rhythm and time as individual concepts. Reddy (1911: 79) states that, unless a piano student becomes a good sight-reader,

> … his knowledge of musical literature will tend to be confined to a few pieces learnt more or less mechanically. A child should be taught to read music as he is taught to read a book.

2.2.2 Renowned South African piano pedagogues' views on sight-reading: A series of interviews

A series of formal interviews with four internationally acclaimed and renowned piano performers and teachers considered to be absolute experts in their field explored various views on sight-reading. Each interviewee was asked four critical questions relating to sight-reading in piano tuition. The questions are as follows:

1. How would you define good sight-reading?

2. How many advanced piano students have good sight-reading ability when they commence lessons with you?

3. In your opinion, what obstacles stand in the way of good sight-reading?

4. What additional insight regarding sight-reading and sight-reading skills could be useful to other teachers and students?

For the purpose of clarification, the responses of each interview have been bracketed together under the relevant question heading so as to compare and contrast their individual responses more accurately.

Question 1: How would you define good sight-reading?

Marian Friedman[6]: *Good sight-reading is the ability to perform an unknown work in as fluent a manner as possible and most importantly which communicates the character, colour and shape of the work so that it is meaningful to the listener.*

---

[6] Marian Friedman: Marian Friedman's musical career began at the age of seven when she became the youngest pianist to perform on the South African Broadcasting Corporation (SABC). From the age of ten she performed throughout South Africa giving recitals, concertos and recordings for the SABC. Marian attended master classes with Peter Feuchtwanger (Vice President of the European Piano Teachers Association) in England, Vienna, Switzerland and Japan, and was special assistant to Menahem Pressler. She has performed and broadcast in Europe and the USA (most recently at the Newport International Music Festival, Rhode Island). A CD titled *Marian Friedman in Concert* (CD BMG label CDCLA (WM) 002) is currently available. Marian Friedman is Principal Tutor (Senior Lecturer) in the Wits School of Arts, and is coordinator of undergraduate performance studies. Accessed http://www.wits.ac.za/academic/humanities/wsoa/music/8795/staff.html

Gisela Scriba[7]: *It is the ability to perform any composition or piece of music as fluently as possible, maintaining a steady meter and pulse as well as a sense of tonality, while adding sufficient and efficient musical aspects to convey the intentions of the composer.*

Elsabe Feldtmann [8] : *The ability to perform an unknown work in a musically meaningful way.*

Petronel Malan[9]: *If you're looking at new repertoire, just to be able to play through, getting some idea of the music - that could be sufficiently "good sight-reading" for the soloist. If you're in a chamber group and you're all reading some new repertoire together, you'll probably need even better sight-reading skills to be able to play with other musicians. I also happen to think that "faking" a section under such circumstances, is a necessary skill!*

Albie van Schalkwyk[10]: *Good sight-reading is the ability to understand, when looking at the score of a new work for the first time, the implied different aspects of an unknown work (style, changing tonality, the relative importance of melodic, harmonic and rhythmic elements, texture, colour, timing. etc.) well enough to render an intelligible enough (not necessarily perfect) version of the piece to resemble a performance of it. The benefactor in this process should be the reader himself, not necessarily any listeners.*

Interviewee opinions overall reflect the view that "good sight-reading" translates to the ability to read and play an unfamiliar score in a musical, uninterrupted manner.

---

[7] Gisela Scriba is a renowned piano teacher and member of the South African Society of Music Teachers in Pretoria, South Africa.

[8] Elsabe Feldtmann is a renowned teacher specialising in teaching the very young and author of the *Noot-vir-noot* beginner series.

[9] Petronel Malan: International renowned pianist. http://www.petronelmalan.com

[10] Albie van Schalkwyk is one of South Africa's doyen accompanists and chamber musicians. Prof. van Schalkwyk is currently Associate Professor at the College of Music, University of Cape Town.

<u>Question 2: How many advanced piano students have good sight-reading ability when they commence lessons with you?</u>

Marian Friedman: *Hardly any, as it is one of those skills that is either never practiced or considered a priority. Possibly most student pianists feel that they will rarely be placed in a position whereby their sight-reading skills will ever be tested and if so whether it will be of concern if they can't manage acceptably.*

Gisela Scriba: *I have not had one who had good sight-reading skills when transferring from another teacher. Generally the reading of rhythms seems to be the greatest problem.*

Elsabe Feldtmann: *As I work with all ages, most of my advanced piano students have been with me since their very first lessons. Those that started with me at an advanced stage were mostly average sight-readers. So the answer is probably none.*

Petronel Malan: *I don't teach lessons so I'm probably not the right person to ask this question to; however, I can tell you that most of my friends at university and most of my pianist friends are pretty darn good sight-readers! If we sit down together just to read some 4-hand or 2-piano stuff for fun, I'm always surprised how amazing they are. In the US, piano students can make a lot of pocket money being able to sight-read well for other instrumentalists, choirs, for a church job, for chamber music classes etc. so on average, I'd say that the standard piano major, I've encountered has really good sight-reading skills.*

Albie van Schalkwyk: *It is rather unusual for piano students at university level to come with good sight-reading skills.*

With the exception of Professor van Schalkwyk and Petronel Malan, all the interviewees had similar experiences in new (but advanced) piano students; they were poor sight-readers.

Question 3: In your opinion, what obstacles stand in the way of good sight-reading?

Marian Friedman: *It is mostly governed by self-doubt and anxieties of exposing one's weaknesses in public. This in turn could cause much insecurity in one's overall ability to perform. Most students are better sight-readers than imagined only they are too apprehensive to reveal their shortcomings. However I also feel that (and this might be a controversial aspect) reading too far ahead despite the fact that this is necessary on one level can be problematic on the one hand. Students try to take in too much which is impossible to absorb effectively given such short time. They should rather consolidate the rhythm at the start which although could change in the course of the work remains largely consistent throughout. I feel that this will give them more confidence and most importantly a reference point which is sorely needed.*

Gisela Scriba: *An internal feel of rhythm is essential for good sight-reading, but is apparently often absent. Often a sense of tonality also doesn't exist; one needs to have the key "under your fingers". I find that students want to read every single note and cannot grasp patterns or motives. Their eye is not used to read up front and they get stuck as soon as there is passage work. Unfortunately time limitations are a big obstacle: we are always too busy polishing the set repertoire so that no time is left to regularly read unknown music. Lack of self-confidence in sight-reading therefore results.*

Elsabe Feldtmann: *In my opinion - and I speak from my own experience, when as an advanced student my sight-reading was below average - the biggest obstacles in the way of good sight-reading is a "slow brain". A "slow brain" is the result of weak foundation in the basics of musical language i.e. Not really knowing your notes; not having developed a good keyboard-sense; note knowing your keys; and not being able to recognize intervals and chords (horizontally and vertically.) This as well as a weak technique affects the quickness of physical reaction to visual stimuli, which is necessary for good sight-reading.*

Petronel Malan: *Probably just lack of experience. Once you do it enough, it is easy to get comfortable with reading, get comfortable with "faking" a section to make it work;*

Good rhythm is essential for good sight-reading. You might not play all the notes in a certain difficult passage, but you need to keep the rhythm to stay with your instrumentalist/chamber group or choir - so mentally knowing which notes are most important to be able to continue, is valuable.

Albie van Schalkwyk: *Ending up with little sight-reading skills is probably due to the fact that young pianists are allowed to think (surely they are not necessarily actively taught this) that sight-reading is something one practises a bit in order to pass an exam, rather than that it is a sign of knowledge of the interrelated aspects of playing to do with symbols and their meanings (theory), synthesis of these (musicianship) and translating it into coordinated physical movements (technique). It should be part of every lesson, presented in a way that shows its link with musical inquisitiveness. If your experience of "music" is practising the same few pieces for months and then getting marks for one performance of them, it has little to do with music anyway. Small wonder then that young players don't feel stimulated to read everything they can lay their hands on all the time. There is no such thing as unsuitable reading material - everything is reading material. Students are not encouraged to buy completed volumes of standard repertoire of even the pieces they are performing at any given moment. Photocopying only one Haydn or Mozart or Beethoven sonata prevents students from having endless sight-reading material in their hands.*

Students feel unable to sight-read because their musicianship skills are not always developed as such. It is only when you see symbols and understand how to synthesize these into a coherent and flowing performance that you become a good sight-reader. Fortunately there are very few occasions where one is expected to sight-read in public (exams are an unfortunate example of this) so the idea of learning a new piece fast and correctly is more important than the sight-reading ability itself (which is why Quick Studies count more in our department than Sight-reading.)

Two important reasons (although they cannot be seen as obstacles) for the continued or increasing absence of sight-reading skills is the availability of photocopying and the availability of recorded material. Recorded material (especially the new favourite, YouTube) means that students do not have to find a score and decide for themselves what to make of all the information. They get someone else's

interpretation and the teacher is always there to tell them where they learn wrong notes of disregard the indications of the composer. This passive experience of "music" does not develop curiosity about the playing of music (just the listening experience) and this will always result in poor sight-reading. This, coupled with the misunderstanding that sight-reading is about marks earned in front of a judge/examiner, ensure that the situation stays exactly the same as always.

Interviewees consider a range of factors contributing to poor sight-reading including: lack of confidence and experience, limited understanding of the 'basics' of the 'music language', inability to read rhythm and an inadequate technique.

<u>Question 4: What additional insight regarding sight-reading and sight-reading skills could be useful to other teachers and students?</u>

Marian Friedman: *I feel that this needs to be addressed more on a psychological level than a physiological one.*

Gisela Scriba: *I believe that too much emphasis is given in lessons to perfecting pieces: students should always have new pieces assigned so that they are constantly in the process of reading. One does get lazy to read if you are always playing something you know; Practice, practice, practice it! Quickly look through the piece to ascertain the form and to locate any difficult passages to analyse them as possible scales, arpeggios etc. The quick, instantaneous recognition of certain patterns, e.g. Chords, scales, broken chords and arpeggio is essential. Some incorrect notes are not the end of the world but keep a constant rhythmic flow through-out. Accompaniment was for me the best sight-reading teacher! Whatever happens, you need to keep going!*

Elsabe Feldtmann: *I believe in separate exercises to address specific weaknesses. To overcome any psychological barriers and develop confidence I would recommend the development of two other skills namely ensemble playing (at a level easily managed by the pupil/student) and learning keyboard harmony. Keyboard harmony*

and this was my personal experience, improved my sight-reading and gave me a physical feeling of confidence in moving around on the keyboard.

Petronel Malan: *The more you do it, the easier it gets. There are so many aspects of piano playing that requires attention, which your teacher doesn't necessarily have time to work on sight-reading skills. I think it is a student's own responsibility to find enough opportunities to improve their skills. My teachers never worked on sight-reading with me, but I was always playing with friends, faking difficult stuff I was hoping to play "one day," trying to get through pieces - no matter how hard - just for fun. I played short, easy vocal works with singer friends; we'd get together with two other people and read an uncomplicated trio, and slowly my skills improved. You don't "look over" a book before you read it, so you should get so comfortable with reading notes that you don't need to "look over" a piano piece before you play it.*

Albie van Schalkwyk: *Sight-reading practice should be done on easy repertoire - read as many Grade 1 books as you can until it becomes boringly easy. Then tackle endless Grade 2 pieces, etc. Define with your teacher's help what exactly it is that stops you from reading a comfortably. Sight-reading of duets means more fun, provided that the better of the two has endless patience! And if you know that your sense of tonality is underdeveloped, go for extra theory lessons; if your understanding of written rhythm is not great, go for extra theory lessons; if your ability to recognise a scale or a typical melodic pattern is underdeveloped, go for extra theory lessons. If you cannot even understand basic symbols well enough to find their physical equivalent on your instrument, how will you ever learn to read between the lines, which is what a musician should do.*

While every response of each of these respected piano pedagogues should be carefully considered, the general impression is that piano students should be given more time as well as music to read, they should develop keyboard-harmony skills to recognise chords and patterns and the teacher should aim at instilling self-confidence to counteract fearful sight-reading.

2.2.3 Sight-reading: A personal reflection

This study stems from the personal challenges I have encountered in my profession as a piano teacher. I have been a professional pianist, accompanist and piano teacher for seventeen years. For the last ten years I have been employed as the Head of Piano in the Music Department at St. John's College, an independent private school in Johannesburg where I teach students who range from young beginners to college students. I am also responsible for the administration of both the classical and contemporary piano curricula.

Over the years it has become evident that there exists a need for strengthening and securing the future of piano studies in the aforementioned divisions. In the classical piano division the typical college piano student is quite advanced and one would rarely find a student who is not working at or above the UNISA Grade 7 level. In the pursuit of finding ways to boost future programmes for the development of pianists at the college, I recognised the need to expand my focus to the college student of the future, namely the current young beginner learners. This implies that there is a need to incorporate learning programmes at preparatory as well as the pre-preparatory levels that spur continued growth and interest.

In retrospect, I now realise that I have always believed good sight-reading skills are a vital key to becoming a good pianist. At the age of twenty-one when I first started to teach, I visited many piano studios and talked to specialised music teachers and lecturers in search of a method or approach for laying a sound foundation for healthy sight-reading habits in my piano students.

In 2003 I was fortunate to accompany Professor Joseph Stanford, an international leader in the field of piano pedagogy and my lecturer at the time on a journey to Varna, Bulgaria to visit Professor Marija Geneva. Professor Geneva attended the Tchaikovsky Academy of Moscow where she was a student of Professor Michail Voskressinski. I learned from Professor Geneva in just a few days the invaluable

importance of sight-reading. In her studio, Geneva expects students to perform every three weeks in a concert. Her philosophy is therefore that sight-reading is the repertoire itself. It is sufficient and that all technical stimuli lies within the repertoire she presents to the students. The young piano beginner students are expected to play folk tunes for the first three years in order to gain confidence at the piano. After three years of piano tuition Professor Geneva's students begin with advanced repertoire in the form of etudes, sonatinas and concertinos.

Geneva's methods have proved to be acutely successful. In summary, her philosophy revolving around the absolute concrete development and constant revision of sight-reading leads to quicker development all round and her students are thus able to perform more advanced repertoire at a much higher level because they have no difficulty sight-reading when playing these pieces.

- **Problems with sight-reading at the piano**

In my personal experience, young and older students face similar challenges when attempting sight-reading. I have come to believe that these challenges are the result of numerous shortcomings which have their roots in the early stages of conceptualized development of the students. The following list represents shortcomings, which I believe to be contributing factors to poor sight-reading in piano students.

- **Lacking theoretical knowledge and understanding**

Learning to play the piano starts with knowing the seven basic notes. Western classical music is written with symbols called notes that indicate the pitch and length of time that notes should be played. These notes are written on a group of five parallel lines called a staff or stave. There are various types of staffs the most important being the treble and bass, which are indicated by symbols called clefs.

The treble and bass clefs are illustrated below in figure 2. Clefs assist the pianist in knowing which hand should play the note and in placing it on a keyboard.

Figure 2: Treble and bass clefs

There are various types of notes that have different note values, the explanation of which is beyond the scope of this document. Notes are written on the lines and in the spaces of the staff. There are seven natural notes on a keyboard which are A, B, C, D, E, F and G. These groups of seven notes repeat themselves to make up a full keyboard. The distance between any two of the same notes on the keyboard is called an octave since there are eight notes between them. There are several octaves on a piano.

The following diagram (Figure 3) also shows how one note on the keyboard can be represented on both bass and treble clef.

Figure 3: Notes on the keyboard relating to the staff
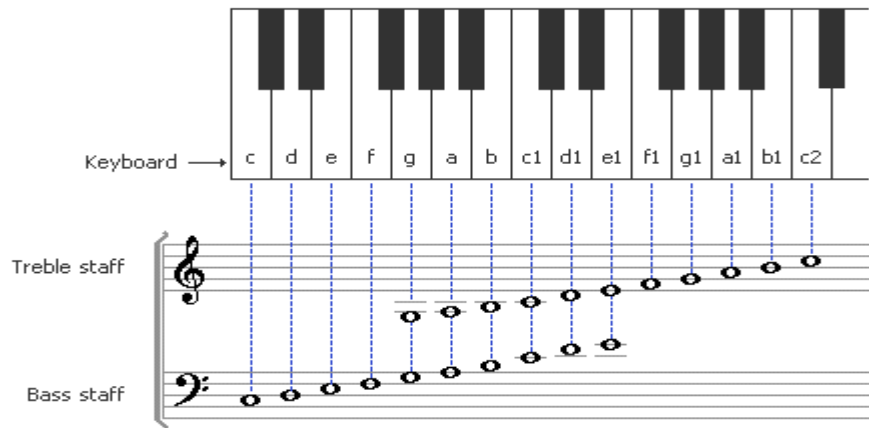
Students often do not have sufficient theoretical knowledge to support their practical piano learning. Students who do not know their staff notation cannot sight-read fluently. Some students cannot relate the melodic contour (ascending and descending pitch and intervals) to the keyboard. Since they do not know the notes which form the contour of the melody, they find it difficult to relate the notes to the correct keys on the keyboard. A lacking knowledge of the keyboard exacerbates this problem. The primary result is that what they play is actually not what is written.

Some students often experience particular difficulty when reading notes in the bass clef or when simultaneously reading the treble and bass clef when they are required to play both hands together. Other sight-reading problems arise when students are unfamiliar with the concept of ledger lines, which hinders reading notes written outside of the staff.

Students who find sight-reading challenging often lack the ability to translate interpretational symbols in the music (tonal, dynamic, articulation, accidental and

tempo markings). This causes a series of other incidental problems which are listed below:

- They forget the key signature and thus the implications of the accidentals on the notes;

- They dissociate their playing from the time signature when they are sight-reading;

- They neglect different dynamic levels required in the score; and

- They do not translate symbols indicating phrasing, articulation, mood, tone and tempo when sight-reading.

Even when students have an acceptable understanding of music theory, they sometimes cannot read the music at the prescribed tempo or compromise appropriate piano playing in an attempt to manage to play all the notes. An under developed technique is an important factor in all of the above problems. While good technical ability and a thorough understanding of related music theory is always crucial, it is important to note that young piano beginner students who do not know the layout of the piano keyboard can never succeed at piano sight-reading. It must be stated that shortcomings displayed by piano students as listed above differ from student to student based on the individual's commitment, talent and/or level of playing.

I am convinced that thoughtful teaching in the beginning stages of keyboard training can prevent many or most of the shortcomings listed above. Piano teachers need to adequately lay the cornerstones for the development of proficient sight-reading skills. Because this study investigates the use of a computer game that through audiovisual stimuli teaches the notes C-C[1] on the keyboard, it is an excellent point of departure for the initial one on one beginner lesson.

As is mentioned numerously, this study investigated the use of a computer game conceptualised for fostering healthy sight-reading skills in beginner piano students. For the purpose of this study, the shortcomings perceived to be contributing factors in deficient sight-reading skills will be classified according to two themes, here:

1. Knowledge of the keyboard layout to improve the tactile sense of the young pianist; and
2. The use of beginner books vs the use of an original developed computer game for fostering sight-reading skills in beginner piano students.

Due to the composition of black and white keys the first impression of the keyboard is not always logical to the young piano beginner student. Playing different pitch levels on the piano may for some children easier to locate than for instance on the violin where the violin student needs to combine the ear and finger position to learn the correct notes. When a teacher underestimates the level of difficulty involved in learning to know the keyboard it may undermine development. The process requires careful or delicate mentoring and the converse could be the cause of a piano student's progress being curbed because they ultimately do not know and fully understand the nature of the very instrument that they are aspiring to master.

Curwen (1913: 10) states that the piano teacher's chief objective is to give the piano student "right and clear ideas about connection between the staff and the keyboard". I use this philosophy (keyboard and music staff orientation) when introducing the letter names of the keys to the piano student.

The student starting piano lessons may be overwhelmed by the vast amount of information that he or she needs to remember when starting to play the piano, but it is the understanding of the piano keyboard in recalling every individual aspect at a time during playing the piano that ultimately leads to fluent and correct playing.

A piano student who does not know the keyboard will essentially be limited in his/her practical ability. A young piano beginner student who does not have a definite mental image of the relation between the keys on the keyboard and the printed music notes which represents these keys, will find it difficult to move freely and find the printed score on the keyboard. Such a student will continuously be searching for the correct notes to play. Campbell (1997: 35) notes:

> It is important to improve the tactile sense of the young pianist. It is so vital to be able to "feel" the keyboard while keeping the "eye on the book" when sight-reading. One can point out here how the blind often have an almost infallible instinct.

When a young piano beginner student is constantly searching for the correct key, it may cause interruption of the beat of the music. Without the beat, the playing becomes unmusical. This kind of playing is detrimental to the individual because it affects other aspects of one's own music education and thus their development and proficiency.

One great hindrance to reading is the habit of constantly looking down from the score to find the corresponding places on the keyboard. Cooke (1960: 141) refers to this action as the "marionette nod" where the student finds his position on the keyboard after reading every note. This not only slows down the speed at which the young piano beginner student reads but it also leads to poor coordination and may eventually prevent technical development. Ahrens and Atkinson (1955: 76-77) do not only warn the piano student to keep their eyes on the music but encourage the learner to read ahead. Enoch and Lyke (1977: 47) state:

> Music reading requires the eye to be on the page, not on the hands. The reason is that if a student looks at his hands while reading, he will lose his place on the printed page. The student should learn the necessity of keeping his eyes on the music and feel his way, knowing the keyboard in terms of its typography and intervallic distances.

The first aspect before any child would understand the world of piano playing would be to know the layout of the piano keyboard. During an interview with Claudine van Breda, a renowned piano teacher in South Africa, she states that for beginner pianists, one of the primary cornerstones in piano teaching is that: "What you see, is what you know is what you do". Careless mentoring of beginner piano students in regard to the piano keyboard layout may cause what is referred to as limited seeing, which could ultimately lead to limited knowing and finally results in limited doing.

When a beginner piano student can bring the symbols on the score to life by playing what is written in the music score, he or she experiences the joy of music making. More importantly, he or she experiences the joy of hearing such music produced by him or herself. This is a very rewarding exercise. Further, the feeling of having accomplished something worthwhile serves as source of encouragement and motivation. This experience is still very real even when the music is written for beginners in an uncomplicated and simple manner. Unfortunately, such a joy is not likely to befall a pianist who is not familiar with the keyboard. Lehmann & Ericsson (1996: 5) specifies that piano students may struggle to relate their keyboard knowledge because:

> …relocating a current position in the music after looking at the keyboard and refocusing the eye might disrupt the continuously on-going encoding process.

Taking time to observe the key and time signature of music before commencing a performance, or skimming through the notation may add sight-reading problems for the piano student who is not familiar with the layout of the piano keyboard.

Lateral coordination happens when the two hands play at the same time. But the actual process involves much more than that, such as reading of ledger lines (middle C for example); remembering of note values and note names at the same time; finding the note on the keyboard and playing a combination of rhythms etc. One has to take into consideration that the beginner piano student's hand is still under-

developed. Playing with this underdeveloped hand, he or she will also be expected to think laterally; read horizontally; apply physical challenges such as rotation of the arm; jumping an octave or a large interval; playing chromatic notes; grasp the technical playing of an arpeggio; *cantabile* playing; use the thumb; stretch the fingers in combination of the third and the fourth finger; finger strength with dexterity; and coordination one hand or both. Thus the importance of knowing the keyboard must to be firmly established early in the curriculum or the eventual goal of music making will not be attainable.

I believe that during beginner piano lessons, the child must first and foremost be taught to feel comfortable with the layout of the piano keyboard. The way that children are introduced to the layout of the piano keyboard will differ from teacher to teacher. Thoughtful teaching in the beginner stages of keyboard training can prevent sight-reading problems and spur confidence while getting equipped with the piano keyboard.

While knowing and understanding the layout of the piano keyboard is vital for developing good sight-reading, knowing the note names is equally important as the ability to quickly locate the key on the keyboard. Many tutor books are clear in their approach to the layout of the piano keyboard. Having taught for the past seventeen years, I have studied some of the beginner material used by various piano pedagogues. Some of these included: J. Thompson, E. M. Burnam, J. Ching, A.J, Curwen, G. Kurtág, M. Heller, L. Fly, J. Last, I. Rodgers, L. Phillips, A. Caplet, J. Bastien, F. Watermann and E. Feldtmann. Using the books on a rotating basis, I have gained valuable information on how to teach the piano keyboard layout to beginners at the piano.

- **Beginner piano books and beginner sight-reading**

The current top four best sellers of beginner piano tutor books in Gauteng (according to Edumusic and Lovemore Music book suppliers respectively) are: John

Thompson's "Miniseries", Edna Mae Burnam's "Mini-steps", Lina Ng's "Piano Lessons Made Easy Level 1", and Bastien's "Beginner Series".

The table below is a summary and brief keyword commentary of some of the above beginner series' that are useful in choosing a preferred method:

Books	Edna Mae Burnam's "Mini-steps"	Bastien "Book One"	Lina Ng's " Piano Lessons Made Easy Level 1"	John Thompson's "Easiest piano course"
Use of Colour	Pictures not coloured in	Very colourful	Pictures can be coloured in	Later editions very colourful
Context	Simple and understandable	Simple and understandable	For the advance beginner	Simple and understandable
Keyboard range	Small range starts on middle C	Learns in positions	Starts hands separately then moves together at an advanced level	Small range starts on middle C
Rhythmic difficulty	Crotchet as main beat	Crotchet as main beat	Crotchet as main beat	Crotchet as main beat

Two of my favourite beginner book series on the market which I use in my music studio, are John Thompson and Edna Mae Burnam's beginner series. These books - also recommended by Claudine van Breda (2012) - are meticulous in their approach to the beginner pianist. Finding the notes on the keyboard is also simple and the music moves in a grade stepwise spiral development. Because the music moves from middle C to the next note in stepwise motion, the child also masters the layout of the piano keyboard better through learning the notation and duration of the music. The new Thompson series is so colourful, it invites interaction and working on a systematic syllabus where the child formulates his knowledge with a single concept at a time which works fabulously.

The progress sometimes feel slow in the beginning but the advantages of stepwise progress is exponential. The Thompson series starts from middle C and works stepwise out to the interval of a fifth, which means it utilises the small hand (finger one to five) position within the eye-span of the child. The pieces are simple and enormous revision takes place as soon as a child has mastered or been introduced to a specific note name or pitch. The print is large enough so that the child does not need to guess in distinguishing between the different note names. The scenes also incorporate text and colour to help the child with grasping the given concepts and simulating the level of concentration. The pieces are never long and this helps to make the playing a small performance, which is an enjoyable experience for the young beginner and the teacher.

The teacher can help the young piano beginner student with the rhythmical concept while concentrating on the note pitch when the teacher joins in with the given accompaniment part. Most of the beginner pieces are in simple rhythms so that the child can develop a good sense of rhythm whilst learning the note names.

Teaching a child notation and rhythm at the same time between the different hands can be quite a challenge. In the Thompson series, the elements of learning notation and rhythm simultaneously are very easily achieved and motivation to move on to the next level is very exciting and manageable for teacher and child. The revision of concepts also happens in the form of small theoretical exercises. The technical challenges are also well integrated seeing that the young pianist only uses his stronger fingers 1, 2 and 3 (thumb to index finger) thus allowing better control and execution. The coordination between the hands is also attained seeing that the hands work separately before they start playing together. The child has complementary aural training with increasing cumulative awareness while playing in a duet with the teacher. Lastly, there are great motivational aspect recognitions in this series in that the child receives a certificate when completing the set studies and is found on the last page of the book.

Another beginner book used frequently is the "Mini-steps" series by Edna Mae Burnam. My personal method is to combine the use of two or more tutor books simultaneously when teaching. The material and methods in both Thompson and Burnam's books are very similar. Both books move systematically from one concept to another. When new concepts are being introduced the pieces are very short to make sure that the student grasps the main concept. One of the successes of the Burnam series is that after the practical element has been introduced, revision in the form of theory also occurs. These theoretical exercises are creative and the student may not even be aware of the homework element by doing the revision in the form of a game or colouring in a picture whilst the given concept is hidden behind all the fun. "Mini-steps" also incorporates the element of spoken language (spoken rhythm and words that accompany the music) while playing the piano so that the child develops a natural sense of rhythm with reading at a steady pace.

When the teacher asks the child to read the notes and the text at the same time, the child not only expands the eye depth of expression to read notes and words simultaneously but also develops a smoother sense of playing, reading the notes for their full value. The advantages in developing both hemispheres of the brain thus happen simultaneously.

There are many ways to improve a young piano beginner student's sight-reading ability, but the main focus must be to read music with ease at a great speed and with accuracy. Some of the beginner tutor books add words to the note values whilst the student plays the notes. This may help the student not only in holding the notes for the right value but also expand the interval at which the eye moves to read note names, note values and words at the same time. To read through a sentence, the student needs to move the eye from one word to the next so shall the eye then be forced to move from the one note to the next. From practical teaching experience, young piano beginner students at some point have difficulty in reading past the bar line. Adding words to note values is an excellent method to force the eye to keep moving. What the eye sees is what the student knows and is essentially what it does.

Therefore, if a young piano beginner student has difficulty in sight-reading, there are three aspects that will need constant revision:

1.   The knowledge of the notes;

2.   Keyboard knowledge (finding the right note on the keyboard); and

3.   The reaction and movement between eye and hand. Many books can help with this note naming, revision and sight-reading, but what better way to do revision than to sit at a computer and play note and keyboard recognition games?

Learning to read music can be compared with learning to read written text. Reading text is more than the simple recognition of alphabet letters. The numerous combinations of these letters will form words, and these are the building blocks or bricks of the text. Together, the numerous combinations of words in the text will construct the author's intended sentences or music phrases and eventually the entire score. The implication is that music students need to learn not to focus on every note, but rather to look for the musical sentences or phrases that are made up of varying combinations of different notes. Last (1954: 82) agrees and cautions the teacher not to;

> … merely make piano a study of innumerable signs and symbols but to pay close attention to recognition of intervals, lines and spaces and rhythmic clapping.

Not only does poor coordination between the written score and the hand coordination slow down the young piano beginner student's sight-reading ability it may eventually prevent technical development because the brain does not have time to focus on the technical content of the score. Ahrens and Atkinson (1955: 77) do not only warn the piano student to "keep their eyes on the music" but encourage the learner to "read ahead". The above piano pedagogues Last (1954), Ahrens and Atkinson (1955) imprint the simultaneous development of memory and the ability to read.

Edna Mae Burnam approaches the rhythmical development with the introduction of the crotchet as the main beat. A student may be very aware of the one count note value through association when walking or even a simple heart beat. Before one can explain the mathematical complexities of quaver beats, the student must first master the concept of crochets, minims and semibreves, interpreted as a one count, two counts and a four count note, respectively. The introduction of a three count note and the adding up of beats are already quite advanced seeing the child has not been introduced to the concept of sub-division, e.g. a dotted minim equals a minim plus a crotchet.

Although Edna Mae Burnam uses less colour than the John Thompson series, one can however argue the fact that a baby only distinguishes between black, white and red. Therefore simple use of colour can have some advantages over too colourful and detailed images. The emphasis must rather be placed on the fact that concepts given to the learner must be simple, to the point, and must have a clear outcome of the given subject and content.

Both the Thompson and the Burnam beginning series do not bombard the beginner pianists with information. The logical layout of information will support the outcome of the pianist's understanding the keyboard and the basic notes of the staves and how to apply them between two hands.

No matter what method a teacher uses or a piano student prefers; one cannot emphasise enough the importance of the first few lessons for this will determine the interest, love and acceptance of the knowledge and mastering of music. When reading at sight there is no time to stop and arithmetically analyse the piece. This is the proof that for good sight-reading all concepts must be known in advance.

2.3   How do young children learn?

The "Creative curriculum for preschool" (Trister Dodge, et al., 2002) is based on the knowledge and understanding of children stemming from seventy five years of research (2002: 17). This curriculum deals with the following areas of development in preschool children: social and emotional, physical, cognitive and language development. While focusing mainly on creative curriculum understandings of these areas of development in the preschool stage, the following discussion also refers briefly to principles of various renowned authors of early childhood development.

2.3.1   Social and emotional development

Martin Woodhead (2006: 20), Professor of Childhood Studies at the Open University, UK, includes the following as the major themes in the field:

- Young children develop through a social process (citing Richards and Light, 1986; Schaffer, 1996; Woodhead et al., 1998);
- Cultures of early childhood are also profoundly social, expressed through peer group play, styles of dress and behaviour, patterns of consumption of commercial toys, TV, and other media (citing Kehily and Swann, 2003).

The "Creative curriculum for preschool" (hereafter 'Creative Curriculum') regards social and emotional competence as vital to the well-being and essential to preschool children's well-being and achievement in school and life. Preschool the ideal time to acquire social and emotional well-being. In the preschool, social/emotional development is about socializing – learning what is acceptable by others and developing confidence in a group setting. Three goals are identified in this area:

Achieving a sense of self:

1.   Knowing oneself and relating to other children and to adults;
2.   Taking responsibility for self and others; learning to following rules, respect others and routines, and take initiative; and

3.   Behaving in a pro-social way; learning to show empathy, to share and take turns.

2.3.2   Physical development

Physical development involves children's gross (large muscle) and fine (small muscle) motor skills. The Creative Curriculum notes that physical development is often taken for early childhood classroom based on the assumption that it happens automatically. While this is totally untrue, teachers should take responsibility for the physical development of children in their care as it is a crucial area of development. With the needed focus on advancing physical development, children benefit by mastering increasingly sophisticated tasks and gain personal responsibility for their own physical needs. This again will improve their social and emotional development.

> As children learn what their bodies can do, they gain self-confidence. In turn, the more they can do, the more willing they are to try new and challenging tasks. (Trister Dodge, et al., 2002: 18).

There are two goals for physical development: The first, achieving gross motor (large muscle) control, does not relate to the focus of this study – young beginners introduced to the layout of the piano keyboard through the game. However, the second goal, namely achieving fine motor control (which normally happens later than achieving large motor control) is indeed relevant to the study.

Creative Curriculum fine motor control goals:

1.   Achieving this goal allow children to use and coordinate the small muscles of the hands and wrists with ease; and
2.   The above opens the door to developing self-help skills and the ability to manipulate small objects such as scissors and writing tools.

In *Developing Minds with Digital Media: Habits of Mind in the YouTube Era,* Weigel and Heikkinen (2010: 4) note that the developing motor control in the age group three to five allows these children access to "more forms of digital media".

2.3.3 Cognitive development

Cognitive development (focus on the mind and how it works) involves how children think, see their world and use what they learn. Weigel and Heikkinen (2007: 1) offer the following definition for cognitive development:

> A simple way to interpret children's cognitive skills is to look at how they are less than adults - less coordinated; less articulate; less able to control their impulses - and how they grow to be more like adults over time.

Brooker and Woodhead (2010: 20) note that the cognitive development of children is an apprenticeship – it occurs through guided participation in social activity with companions who support and stretch children's understanding of and skill in using the tools of culture.

Creative Curriculum cognitive development goals:

1. Learning and problem solving; they begin to acquire;
2. Use information, resources, and materials purposefully. They observe events in their environment and learn to "ask questions, make predictions, and test possible solutions, learning reaches beyond just acquiring facts" (Trister Dodge, et al., 2002: 21);
3. Thinking logically; they learn to make sense of the information. This happens when they start to compare, sort, count, measure and recognise patterns. This helps them to gain an understanding of how their world works; and
4. Representing and thinking symbolically; they learn to use objects in a special way, such as using a cup as a telephone or a broom as a horse.

One of the intended advantages of the game is that, once young children who have played the game learn to play the piano, they can, through their imagination and association with the characters and the story, relate the actual keyboard to the game.

Siegler and Alibali (2005, 39-42) note that children in the age group three to five will fall in Piaget's "Pre-operational" cognitive developmental stage. According to Piaget these children could on the one hand have difficulty to see the world from another's perspective, but in the pre-operational stage they will "gain the ability to use symbolic representations of the world such us images and language".

2.3.4 Language development

Vygotsky indicates that language plays a vital role in the intellectual, social and problem-solving development of humans (1978: 56-57, cited by Härkönen, 2006: 109). Language development deals with the continuously increasing understanding of and communication through spoken and written words. Children naturally have the ability for verbal and non-verbal communication with others. When entering preschool, the ability to express thoughts and feelings through spoken words become very important. Trister Dodge, et al., (2002:22) note:

> Because words represent objects and ideas, language development is closely related to cognitive development. With frequent language experiences between the ages of 3 and 5, children's vocabulary can grow dramatically. The richer a child's vocabulary, the more likely that the child will become a good reader. Language and literacy skills go hand in hand. Listening, speaking, reading, and writing develop interdependently in children.

Crosser (2004) points out that a "typically developing child tends to achieve language fluency around age three". She explains that preschool children can be expected to have acquired adequate language skills to enable them to follow a storyline, and engage in discussion on the characters and events in the story (Crosser, 2004).

Creative Curriculum goals for language development in three to five year olds are:

1. Listening and speaking; growing in their use of the spoken language to communicate and express themselves, understand oral speech of others and to solve problems. This allows them to store more information and relate better to others and their world.

2. Reading and writing; learning what written language is all about, learning the alphabet and to read and write letters and words. This opens new worlds of information and imagination to them, so expanding memory, communication and understanding (Trister Dodge, et al., 2002: 22).

As is mentioned in Chapter 1, final year information engineering students, of the University of the Witwatersrand helped developed my concept. To achieve this I assumed the role of software engineering student-team's client. The writing of the music computer game introduced in this study was overseen by Pippa Tshabalala[11].

During the pre-design phase of the game the following principals were established in search of developing an E-learning tool to promote good sight-reading skills through and age-appropriate learning experience:

- We would design and develop a game that provides visual and auditory stimulation to maintained the student's focus while learning the layout of the piano keyboard of the keyboard;
- A narrator, using age appropriate language, would navigate the players through the game;

---

[11] Tshabalala (formerly a lecturer in Animation and Video Game Studies in Digital Arts at the University of the Witwatersrand) has designed and facilitated numerous courses for students to design computer games that not only entertain, but also educate the players. Motivated by her belief in the value of educational computer games, Tshabalala currently presents "The Verge" - a programme on national television (aired on DSTV 2008-2012) which introduces computer software programmes that are available on the market to viewers in the comfort of their homes. By making use of this public forum, parents and mentors can see that claims that computer games are inevitably "bad for children" are not necessarily true. Platforms like "the Verge" give broad insight into what is available on the market in the form of education based software and to what extent such games can serve as an educational tool.

- The game would employ interactive participation of the student;

- The beginners will be able to control their own pace of study when engaging with tasks in the game;

- The game must develop hand-eye coordination (in this case the ability to direct the pointing device, e.g. the computer mouse based on visual and aural stimuli without looking away from the computer screen); and

- They must be able to play the game with a friend or in a group environment, to allow for the creation of a more sociable environment to accommodate and encourage peer learning.

It is true that piano playing involves far more complicated processes than using a computer mouse. However, if the possibility exists that playing computer games could promote the habit of keeping one's eyes on the written notes when reading at the piano, it is worth pursuing.

Chapter 3   The Game

In Chapter 1 the background to the development of the storyline of the game and the process of designing and developing the game was discussed. The game came about as last resort effort after failing to engage my first preschool beginner student in piano learning. Chapter 2 established the importance of knowledge of the piano keyboard for sight-reading. This chapter deals with the actual computer game, developed as a tool to teach the layout of the piano keyboard to young beginner students.

The game consists of the following seven scenes introducing the keys C, D, E, F, G, A and B through association with various characters. Colour association is used to enhance the process:

C: *Mrs. C* (purple)   **D:**   *Donkey* (green)   **E:**   *Mr. E* (orange)

F: *Fish* (red)   **G:**   The *Gate* (grey)   **A:**   *Ape* (blue)

B: *Banana* (yellow)

The basic story of the game is aliened as:

- *Mrs. C* lived in a house with two chimneys (represented by the C# and D# keys on the piano).
- She had a *Donkey* as a pet.
- *Mr. E* lived on the other side of the house.
- *Mr. E* liked catching *Fish*. One day he was sitting in his boat and saw an *Ape* in a cage on a nearby island.
- The cage had a *Gate. Mr. E* rowed his boat to the island and opened the *Gate* of the cage.
- The *Ape* was hungry.
- He was given a *Banana.*

Through storytelling, the lesson is then presented in the form of an animated computer game. The following section is a brief outline of the game.

3.1   The Game: Story board

A narrator introduces each scene with step-by-step instructions on how to navigate through the game. Every key is attached to a specific colour helping the student associate the specific key with the character for example D is green and is associated with the green *Donkey*.

Please note: "Player" refers to the student playing the game.

Figure 4:   Scene 1: *Mrs. C*'s room

DVD time: 00:00:38.72
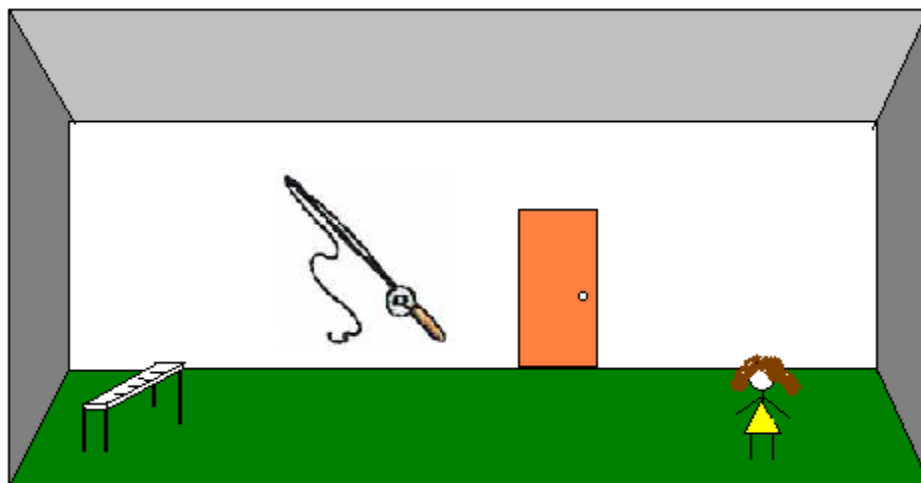
Narrator: Points to *Mrs. C* (colour: purple) who is in her room and wants to play her piano. He asks the player to move *Mrs. C* to the piano by clicking on *Mrs. C*.
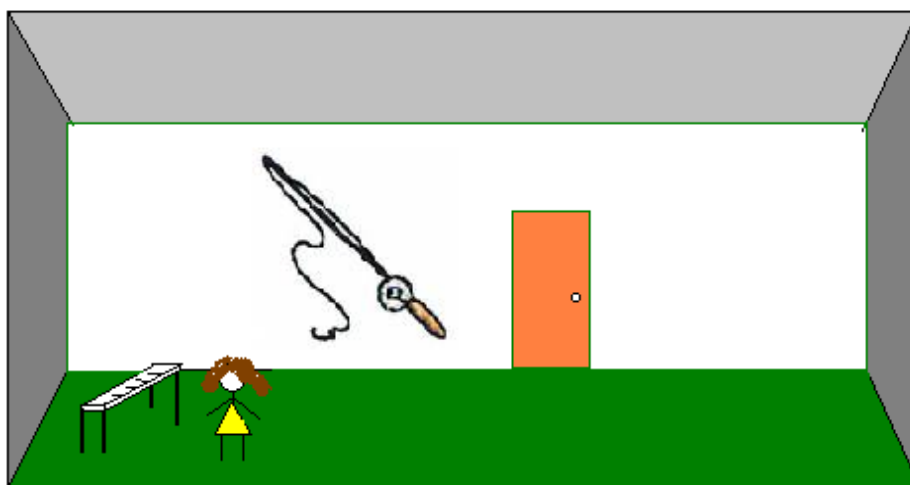
Player: The player will have to take *Mrs. C* to her piano by clicking on *Mrs. C* and then the piano.

Outcome:

Mrs. C (introducing the C key on the keyboard) walks to the piano and starts playing. Applause follows. The player senses the joy of music making.

Figure 5:   Scene 2: *Mrs. C*'s room (*Mrs. C* has moved to her piano)

DVD time: 00:00:39:00

Outcome:

Once *Mrs. C* is at her piano, the C note on the staff as well as the C key on the keyboard will light up and the sound clip for the C key will be played each time the player clicks on her. The C key on the piano, the C note on the staff and *Mrs. C*'s dress are colour coded (purple[12]). The player learns through colour association to observe the layout of the piano keyboard and staff notation within the concept of the story.

---

[12] Please take note that the pictures are not an exact replica of the actual game; the colours of the characters in the pictures are not similar to that of the characters in the game.

Figure 6:   Scene 3: Introducing the *Donkey*

DVD time: 00:00:57.08
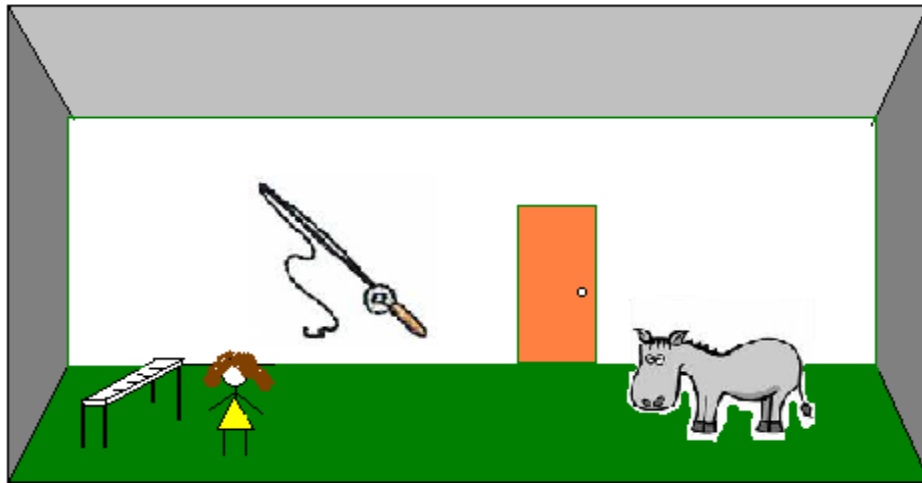
Narrator: Introduces *Mrs. C*'s pet. The *Donkey* (D, green) walks into the room.

Player: Each time the player clicks on the (green) *Donkey* the D note sound is played. *Mrs. C* will still play the (yellow) C note when she is clicked.

Outcome:

In both instances the respective key will light up and the corresponding note will be displayed on the staff. The player has now learned that the C and D keys are next to one another and that the pitch is an ascending tone upwards. The colour association helps the player in distinguishing between C and D (layout, notation and sound).

Figure 7:   Scene 4: *Mr. E* arrives

DVD time: 00:01:22.45
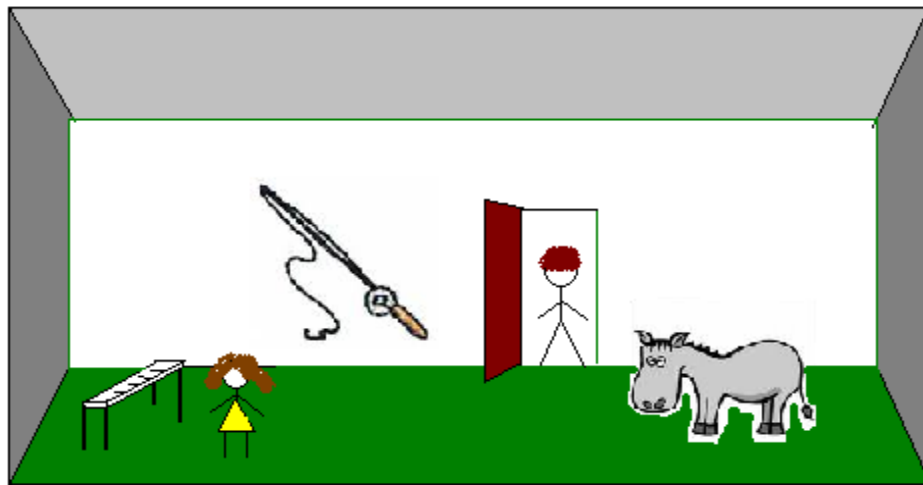
The animated story continues (with interactive visual and auditory stimulus) with a knock on the door with *Mr. E* (colour: orange) visiting the house of *Mrs. C. Mr. E* follows as in the alphabet C, D, E.

|	
Narrator:	Announces the knock at the door and *Mr. E* entry to fetch his fishing rod.
Player:	Clicks on *Mr. E*, the E key on the piano lights up (orange) and the sound can be heard while the note is displayed.

Outcome:

The player can now play three notes on the keyboard: C, D and E. Within four scenes of "the game" the player can now enjoy clicking on the three characters listening to the three ascending tones and see the three keys lighting up on the keyboard.

In the next scene *Mr. E* is in his boat fishing.

Figure 8:   Scene 5: *Mr. E* is fishing

DVD time: 00:02:04:47
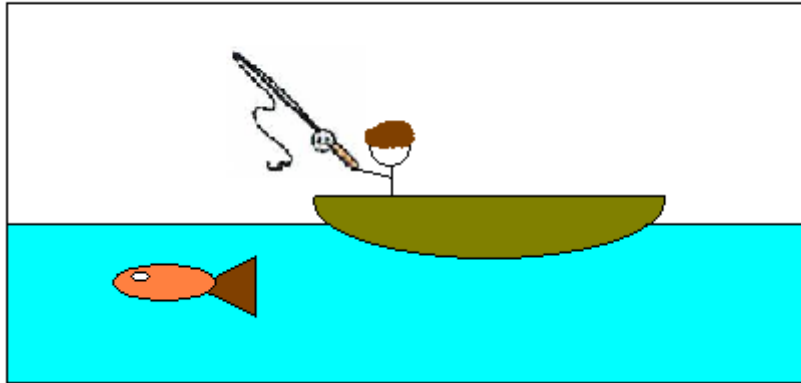
Narrator: Tells the player to click on the *Fish* in the water in order for *Mr. E* to catch the *Fish*.

Player: Follows the movement of the *Fish* through the water to help *Mr. E* catch the *Fish* by clicking on it (eye finger coordination). The moment this action is achieved, the *Fish* will jump into the boat.

Outcome:

Once caught, the *Fish* remains on the boat. Each time the *Fish* or *Mr. E* is clicked, the respective piano key will light up and the corresponding note will be displayed on the staff. The respective pitch is heard simultaneously. Clicking on the moving fish could be challenging for a three year old. This challenge was written into the scene as preparation for sight-reading at a later stage.

In the next scene *Mr. E* rows over to an island where there is an *Ape* in a cage.

Figure 9:   Scene 6: *Mr. E* helping the *Ape* on the island

DVD time: 00:04:14:72
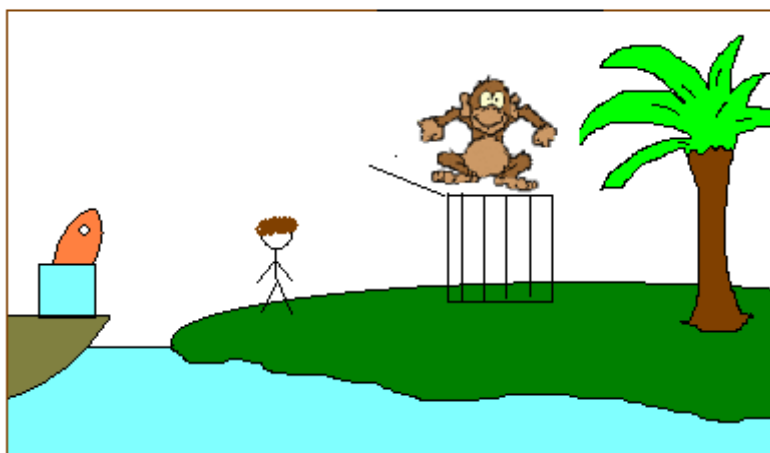
Narrator: Asks the player to click on the *Gate*, thereby opening the (grey)
                   Gate and free the (blue) *Ape*.

Player: By clicking on the *Gate*, the *Gate* opens and the *Ape* escapes.
                   With every movement in this scene, the corresponding pitch is
                   played. Simultaneously the related note (staff notation) and key
                   will light up in the colour allocated to the specific key (and
                   correlating note).

Outcome:

When any character representing a key/note is clicked, the respective key will light
up; the corresponding note will be displayed on the staff, while the correct pitch is
played. The player can now play C, D, E, F, G and A.

Figure 10:   Scene 7: All the characters appear on the screen in this final
                    scene.

DVD time: 00:07:37

Narrator: Tells the player that the *Ape* is hungry, therefore *Mr. E* calls *Mrs.*
                    C from his cell phone to bring some ***Bananas*** for the hungry
                    Ape. *Mrs. C* rides into scene on her ***Donkey*** with some ***Bananas***
                    and feeds the ***Ape***.

Player: The student must click on *Mr. E*'s cell phone. When he or she
                    manages to do so, the ape can receive the ***Banana***.

Outcome:

At this stage all the main characters - *Mrs. C*, the ***Donkey, Mr. E***, the ***Fish***, the ***Gate***,
the ***Ape*** and the ***Banana*** - are on stage. If any of them is clicked, the corresponding
pitch will be played, and the respective key (keyboard) and note (staff) will light up.

The game is intended for young piano beginner students of ages between three and
four. It conveys some of the fundamentals of music theory such as notation, pitch,
note names and layout of the keyboard. Sound, colour and narration is used to help
the children engage with the correct character, and form associations with the

corresponding key, note and pitch. The purpose was to facilitate an exciting educational experience for young piano beginners at an appropriate level for students in this age group. The game incorporates narration and quizzing to teach the player the names of specific keys in one octave on a keyboard. At the same time the alphabet is introduced in a natural and incidental way through storytelling.

Chapter 4   The Case Study

This study investigated the effects of a specially developed music computer game (the game) as addition to piano lessons in the initial piano teaching and learning phase. Of particular interest to this study was the possible effect of the game on the development of young beginners' sight-reading skills. This chapter presents the results of the investigation of the impact of the game on preschoolers in one of St John's College "feeding schools"[13].

4.1   How the research was carried out

I first used the game in 2011 with two groups of preschoolers at the Bridge Nursery School. Lessons were presented in the form of a class music project to the three and four year olds and to a second group of five and six year olds. In my own experience I found that young piano beginner students used the game altering the pace of introduction thereby controlling the levels of conceptualising, accommodation and further application of the given concepts by actually playing it.

I have found by introducing the computer game to the very young three year old students, not having a musical instrument, the benefits of technology were apparent in understanding the piano keyboard layout. Not only did they have an opportunity to experience hands on lessons even though there were no mastering skills required in actually playing the piano, they were able to master the layout of the piano keyboard.

In some cases, the beginner pianist does not have a musical instrument to practise on at home and the review of basic elements must happen in the actual lesson time.

---

[13] In this context: A pre-primary school where the majority of the learners will advance to St. Johns College after completing their preschool education.

Lesson revision is not only frustrating for the teacher but also for the inquisitive young piano beginner student. In situations where beginner students have no music instrument at home the learning process is much slower and in some cases no progress happens at all. In such circumstances the computer game allows the student to do some basic revision.

4.2 Sample group vs control group

What follows is a collection of observations of the sample and control group introduction the layout of the piano keyboard with or without the use of an animated computer game. The table shows the progress of two groups age three to six of students who were introduced to the layout of the piano keyboard through either the game or during their initial piano learning as observed over a series of eight lessons.

Comparing the sample and control group: Preschool students		
Skills relating to sight-reading	**Sample group:** Learning supported by using the game	**Control group:** Learning without the support of the game
Ability to find keys on the keyboard	The computer game was designed to introduce the piano keyboard to a group of students through an animated game to a group of students. By the time students have played this short computer game, they have been introduced to seven notes (middle C – B). I noticed that the students in this group used the game to adapt the pace of learning to suit them. The actions required to play the game promoted active participation in learning process. As most students had access to computers at home, the game could be used as a revision aid. All the above contributed to the students in this group becoming acquainted with the layout of the keyboard in a limited space of time.	Individual piano lessons included storytelling, puppet shows (using characters from the storyline) and word association, such as "d" for "donkey" - the white key between the C sharp and E flat keys. This allowed experiential learning of the keys within the octave. However, keys had to be introduced at a much slower pace than in the sample group – usually on one or two keys per lesson. Also, while few of these beginners had access to a piano outside the classroom, all these students had computers at home. Sadly, as the game was not used in this group, those students who did not have a piano at home were limited in their revision exercises. This impacted negatively on their progress.

Comparing the sample and control group: Preschool students		
Skills relating to sight-reading	**Sample group:** Learning supported by using the game	**Control group:** Learning without the support of the game
Ability to read notes on the staff	In the game incidentally drew the student's attention to the notes on the staff: by clicking "on" the characters of the game, the notation appears in the same colour as the character and the key. Learning is thus enhanced by colour coordination.	Students learn through basic introduction to notes. Starting with middle C, notes are introduced by using beginner series books. The student had to earn to read the notes, pitch and rhythms simultaneously. At times students found it challenging to play the above on the correct position on the piano.
Ability to keep eyes on the score	The students used the computer game as a precursor to their initial piano lesson familiarising themselves with the layout of the keyboard. Students' hand-eye coordination seemed to have benefited from repeatedly playing the game. Starting with sight-reading in their first individual piano lesson, they seemed comfortable at the instrument. Knowing the layout, their fingers could easily find the notes.	Finding notes on the piano playing pieces from beginner series requires good hand-eye coordination. Students in this group often found this challenging. These students took time in becoming comfortable with the layout of the keyboard. Not knowing the layout of the keyboard seemed to hinder coordination between score and keyboard.

Comparing the sample and control group: Preschool students		
Skills relating to sight-reading	**Sample group:** Learning supported by using the game	**Control group:** Learning without the support of the game
Ability to keep a constant beat.	The game does not include rhythm or rhythm reading in its introduction of the layout of the piano keyboard. For this reason I used clapping and drumming activities, flashcards of different note values and words such as "grandpa" for the two-beat minim to introduce rhythm. When these students started with individual piano lessons, their familiarity with the keyboard allowed them to find the correct keys indicated in the score with ease. This seemed to help them to read and play the score fluently without interruption of the beat of the piece.	Basic introduction to rhythms using words like "grand-pa" as a minim (two count note value). Students mastered basic rhythms through clapping or drum activities. I ensured that the students understand the concept of a beat before expecting them to read note values while sight-reading. When students momentary could not find the correct key to play for a given note in the score, the beat of the piece and thus the natural rhythmic flow of the music was interrupted.

Comparing the sample and control group: Preschool students		
Skills relating to sight-reading	**Sample group:** Learning supported by using the game	**Control group:** Learning without the support of the game
Ability to read	Individual piano lessons started as soon as the student knew all the keys of the piano by completing the computer game. Students in this group approached the piano almost as a "known friend". They seemed eager to transfer concepts they became familiar with through playing the computer game to the piano itself. These students seemed to exhibit a real understanding of the relation between the keys of the piano and the letter names. This facilitated good sight-reading abilities.	Sight-reading started with the first lesson at the piano. The students sight-read while learning the layout of the piano keyboard.

Comparing the sample and control group: Preschool students		
Skills relating to sight-reading	**Sample group:** Learning supported by using the game	**Control group:** Learning without the support of the game
Knowing the layout of the piano keyboard	The layout of the piano keyboard seemed to be firmly established through repeatedly playing the animated computer game in class.	When the students started reading notation they were challenged with reading notes on lines and in spaces in relation to the keyboard. Some students had difficulty with grasping the layout of the piano while remembering the theoretical content of the piano score. Al all times I was keen to immediately observe when students had difficulty with depth perception or visual acuity. I always attempted to have a "hands on" approach in these cases, incorporating various strategies to rectify irregularities and continuously help improve reading skills as the student progresses. It was surprising how often the underlying reason for reading problems was related to the student's knowledge of the layout of the piano keyboard.

The above table reflects the value of the game as a tool for young beginners to learn the layout of the keyboard, thus providing a basis for developing good sight-reading skills. Good sight-reading skills will allow them to learn new pieces at a particularly quick pace. This will further improve their sight-reading skills while simultaneously boosting their confidence and interest in the piano and in music, so promoting prosperous piano learning.

The actual skill of piano playing is difficult because young piano beginner students must physically press the piano keys. Coupling this skill to listening and adapting sound duration is quite refined as far as skills go. In the sample group the students mastered the layout of the piano keyboard by using an animated computer game. The level and concentration span of students appeared to be at a higher level on the piano than at the computer. Exposure to the computer game created excitement and the outcome was that more students wanted to start with individual piano lessons. Because of early stimulated exposure to the piano (the layout of the piano keyboard, through an animated game), the students in the sample group know the layout of the piano keyboard and have progressed in their sight-reading ability when commencing their individual lessons.

In both groups the aim was that the young piano beginner student had to know the layout of the piano keyboard. This was achieved successfully, whether using a computer game or having individual piano lessons.

The computer game was fun and made the students feel knowledgeable when moving from the computer to the piano. The young piano beginner students could remember the letter names of the alphabet through associating the letters with the story from the game. They were confident in playing the computer game and moved between the computer game and the piano with ease.

Although this research project did not investigate theoretical knowledge when sight-reading, students who learned the layout of the piano keyboard through making repeated use of the computer game had a better understanding of note reading and finding the notes on the piano.

I have found that students who learnt the layout of the piano keyboard through the game (sample group) developed a confident knowledge of the piano keyboard. Students, who learned the layout of the piano keyboard, with the aid of a computer

game, did not necessarily have to keep their eyes in a book but because they knew where the piano keys were they were able to move with ease from the computer game to reading scores at the piano. The game helped them to keep their eyes on the book while reading the score, which is the primary focal point.

4.3 Outcome and discussion

When using the game, young piano beginner students can control their own learning and pace of learning. Playing the computer game helped me as the teacher gain students' participation and at the same time allowed positive attitudes towards learning to play the piano. I have observed an increased interest amongst the beginner students who managed to grasp the layout of the piano keyboard when this was introduced through the game. The increased interest caused these children to focus better, practise more and consequently made good progress.

The table (page 66-70) reflects the value of the game as a tool for young beginners to learn they layout of the keyboard, thus providing a basis for developing good sight-reading skills. Good sight-reading skills will allow them to learn new pieces at a particularly quick pace. This will further improve their sight-reading skills while simultaneously boosting their confidence and interest in the piano and in music, so promoting prosperous piano learning.

Once the young piano beginner student has mastered the game, an enthusiasm to translate skills learnt onto an actual piano lesson was achieved.

Chapter 5   Conclusion

This research project as outlined in Chapter 1 has expanded and developed into teaching material and software. Not only did the project enrich my personal teaching and learning strategies but it has helped my piano students to gain the necessary foundational skills of synchronised music theory, sight-reading and playing the piano. I found that students enjoyed the introduction of a computer game into their music tuition and gained a better understanding of the lesson content through association, storytelling and use of the game.

5.1   Research questions investigated in this study

The main, critical research question for this study was:

To what extent can a computer music game assist preschool children in understanding the keyboard layout of the piano before commencing the initial piano lesson?

The following sub-questions functioned to embellish the critical research question:

1.   To what extent can the proposed game influence the future sight-reading development of preschool beginner piano students?

2.   What are the factors assisting or hindering good sight-reading in pianists?

3.   Is E-learning (as in the case of the computer music game) a viable strategy for piano teaching and learning?

4.   How do preschool children learn?

The supposition that supports this research is that a computer game can be used effectively as an educational tool to introduce basic music concepts to a student

before starting individual piano lessons. The advantages of this were proven through a carefully controlled group, wherein a technological-driven approach to initial piano tuition was successfully used to introduce the layout of the piano keyboard to students, as a response to sub-question 1.

In Chapter 2 theories uncovered through a literature review, supported by opinions and beliefs of renowned piano pedagogues obtained through interviews, enhanced with personal reflections, formed the basis of the discussion responding to sub-questions 2-4.

The possibility of incorporating music software into individual and group music tuition is a novel method for knowledge transfer. This teaching strategy, which to date has been greatly unexplored, has specific potential for music education in under-resourced and underprivileged environments. The account of the outcomes of the investigation into the influence of the game on the sight-reading development of young beginner piano students provides a detailed, informed response to sub-question 3.

By incorporating the game in my beginner piano teaching programme I did not replace the use of a musical instrument. The game (which acted as a supplement to teaching) introduced the preschool beginners to the keyboard layout of the piano. The young student (even as young as three) used the computer as an additional 'instrument' to play the game. The practical joys of physically playing the actual music instrument should not be disregarded in any way. My personal point of departure is rooted in the belief that the computer game is useful as an introduction to piano tutoring. The outcome of this investigation supports this belief.

5.2 Recommendations

For this research project I have developed and introduced my own product in the form of a computer game. Based on the positive outcomes of this investigation I would recommend that piano didactics in general could benefit from the development of more computer games to address diverse challenges this field.

Further still, future research projects could explore and evaluate existing, or design, develop and assess new computer software programs appropriate to the South African piano teacher or learner. In fact, this could benefit not only piano teachers but any music teacher.

As a lifelong-learner and piano teacher who feels very strongly about the development of good sight-reading skills, I would recommend that all piano teachers should keep investigating teaching methods to advance children's sight-reading ability - both traditional teaching methods and methods incorporating E-learning.

The findings of this research project were overwhelmingly positive. They have served to alter my paradigm with regards to piano teaching: it is my hope that music teachers will take cognisance of the possibility to incorporate computer games in their teaching.

Bibliography

Aaron, M. 1945. *The Michael Aaron Piano Course Piano Primer*. New York: Belwin-Mills Music.

Ahrens, C.B. & Atkinson, G.D. 1955. *For All Piano Teachers.* Oakville: The Frederick Harris Music.

Bakhtin, M. 1981. *The Dialogic Imagination*. Austin, Texas: University of Texas Press.

Barratt, C. 1977. *Chester's Piano.* Book Two. London: Wilhelm Hansen.

Bastien, J. S. 1975. *The Very Young Pianist Listens And Creates*. Park Ridge: General Words and Music.

Bastien, J.W. 1977. *How To Teach Piano Successfully.* Park Ridge: General words and Music.

Bastien, J. W. 1985. *Bastien Piano Basics.* Primer Level. Park Ridge: General Words and Music.

Bigham, D., Portwood, G. & Elliott, L. 1985. "Where in the world is Carmen Sandiego?" *Classic Gaming*. [Online] Available:http://classicgaming.gamespy.com/View.php?view=GameMuseum.Detail&id=23. [2012, August 14].

Blake, J. & Capp, H. 1945. *We Make Music*. London: Boosey and Hawkes.

Bless, C. & Higson-Smith, C. 2000. *Fundamentals Of Social Research methods. An African Perspective*. 3rd edn. Cape Town: Juta Education.

Bloom, B. 1956. *Taxonomy Of Educational Objectives*. New York: David McKay.

Bolton, H. 1954. *On Teaching The Piano.* Great Britain: Novello.

Booth, V. 1946. *We Piano Teachers*. London: Skeffington.

Booth, V. 1971. *We Piano Teachers*. London: Hutchinson.

Bostrom, S. 1988. "Developing stylistic interpretation". *Clavier. (27).* p. 25-28.

Brooker, L. & Woodhead, M. (Eds). 2010. "Early childhood in focus 6: Culture and learning." *The Open University Child and Youth Studies Group*, The Open University. [Online] Available: http://www.issa.nl/newsletter/10/winter/files/Culture-and-learning.pdf. [2012, November 24].

Brown, A.R. 2007. "Software development as music education research". *International Journal Of Education Of The Arts*. [Online] Available: http://ijea.asa.edu/v8n6/ [2012, July 16].

Bryant, A. 2009. *Keyclub: Book One.* London: International Music Publication.

Burnam, E.M. 1959. *Mini-steps Piano Course.* Book One. Kentucky: The Willis Music.

Burnam, E.M. 1970. *A Dozen A Day.* Book One: Primary*.* London: Chapell.

Campbell, D. 1997. *The Mozart Effect*. London: Hodder and Stoughton.

Ching, J. 1962. *On Teaching Piano Technique To Children*. London: Keith Prowse Music Publishing.

Clark, F. & Goss, L. 1993. *The Music Tree: A Plan For Musical Growth.* New York: Summy-Birchard and Warner Brothers.

Cognitive Design Solutions. 2005. "E-learning". [Online] Available: http://www.cognitivedesignsolutions.com/ELearning/E-Learning1.htm. [2012, August 14].

Cohen, L. & Manion, L. 2007. *Research Methods In Education.* 6th edn. New York: Routledge.

Cooke, C. 1960. *Playing The Piano For Pleasure*. New York: Simon and Schuster.

Creswell, J.W. 2002. *Research Design: Qualitative, Quantitative, And Mixed Methods Approaches.* 2nd edn. US: Sage Publications.

Creswell, J.W. 2009*. Research Design: Qualitative, Quantitative And Mixed Methods Approaches.* 3rd edn. US: Sage Publications.

Crosser, S. 2004. "Enhancing the language development of young children." [Online] Available: http://www.early childhood.com/Articles/index.cfm [2012, November 15].

Curwen, A.J. 1913. *Mrs. Curwen's Pianoforte Method*. London: J. Curwen and Sons.

Curwen, A.J. 1913. *The Teacher's Guide*. London: J. Curwen and Sons.

De Aguilera, M. & Méndiz, A. 2003. "Video games and education". *Computers In Entertaiment*. [Online] Available: http://www.franklin.library.upenn.edu/cgi-bin/Pwebrecon.cgi?SC=Title&SEQ=20120814024913&PID=iJL7rKCW8fJVLcBw6kf7rh4R2WL5y&SA=Computers+in+entertainment. [2012, August 14].

De l'Etoile, S.K. 2005. "Teaching Music to Special Learners: children with disruptive behaviour disorder". *Music Educators Journal.* (91) p. 37.

Diller, A. & Quaile, E. 1929. *Off We Go Again!* New York: Chapell.

Dubal, D. 1989. The A*rt Of The Piano, It's Performers, Literature And Recordings*. New York: Summit.

Durrant, C. & Green, B. 2000. "Literacy and the new technology in school education: Meeting the l(it)eracy challenge?" *Australian Journal Of Language And Literacy.* 23 (2). p. 89-108.

Elder, D. 1991. "Six young masters". *Clavier (30).* p. 36-37.

Enoch, Y. & Lyke, J. 1977. *Creative Piano Teaching.* Stipes publishing company. Illinois.

Everest Music Cyberversity. 2003. "The music colouring book for the young Beginner." [Online] Not available. (Hardcopy available from researcher.) http://library.thinkquest.org/15413/theory/note-reading.htm, [2008, July 4].

Fatouros, C., Downes, T. & Blackwell, S. 1994. *In Control: Young Children Learning With Computers.* Wentworth Falls: Social Science Press.

Ferguson, H. 1975. *Keyboard Interpretation From The 14th To The 19th Century.* London: Oxford University Press.

Ferrance, E. (n.d.). "Action Research. In Themes in Education." *The Northeast And Islands Regional Educational Laboratory.* [Online] Available: http://www.lab.brown.edu/pubs/themes_ed/act_research.pdf [2012, August 13].

Fourie, E. 1993. Lectures on style and interpretation. 3rd year piano didactic lectures. *Mimeograph.* University of Pretoria. Pretoria.

Fourie, E. 2004. "The processing of music notation: some implications for piano sight-reading." *Journal Of The Musical Arts In Africa*. [Online] 1:1, 1-23. Available: http://www.tandfonline.com/loi/rmaa20 [2012, July 19].

Friskin, J. & Freundlich, I. 1973. *Music For The Piano*. New York: Dover.

Gee, J.P. 2003. "What video games have to teach us about learning and literacy". *Computers In Entertainment (CIE) - Theoretical And Practical Computer Applications In Entertainment*, Oct. (1) p. 20.

Gore, K. 2011. PianoFlash! for iPad. www.minibooksmusic.com [Online] Available: http://minibooksmusic.com/ [2012, August 14].

Gray, P. 2012. "Freedom to Learn: The roles of play and curiosity as foundations for learning." [Online] Available: http://www.psychologytoday.com/blog/freedom-learn/201201/the-many-benefits-kids-playing-video-games [2012, August 13].

Green, B. & Gallway, W.T. 1986. *The Inner Game Of Music*. New York: Doubleday.

Haddon-Richardson, P. 1978. The elusive half-inch. Licentiate Lectures On Sight-reading. Mimeograph. South African Society Of Music Teachers.

Hallam, S., Cross, I. & Thaut, M. (Eds). 2009. *The Oxford Handbook Of Music Psychology.* London: Oxford University Press. p. 344-351.

Härkönen, U. 2006. Diversity of early childhood education theories in a democratic society. *Journal Of Teacher Education And Training, Vol. 6.*

Hill, S. 2005. "Mapping multi-literacies: Children of the new millennium". *Report Of The Research Project 2002-2004.* South Australia: University of South Australia.

Kafai, Y.B. 2006. "The educational potential of electronic games". *Digital Kompetance: Nordic Journal of Digital Literacy*. (3) p. 184-207.

Kehily, M. J. & Swann, J. (Eds). 2003. *Children's Cultural Worlds*. Chichester: Wiley/Open University: Childhood Vol 3.

Kemmis, S. & McTaggart, R. 1992. *The action research planner*. 3rd edn. Victoria: Deakin University Press.

Kress, G. & Van Leeuwen, T. 1996. *Reading Images The Grammar Of Visual Design*. London: Rutledge.

Kress, G. & Van Leeuwen, T. 2001. *Multimodal Discourse: The Modes And Media Of Contemporary Communication.* London: Hodder Headline Group.

Lankshear, C. & Knobel, M. 2003. "New technologies in early childhood literacy research: A review of research". *Journal Of Early Childhood Literacy*. 3(1), 59-82.

Larrivee, B. 2000. "Transforming training practice: Becoming the critically reflective teacher". *Reflective Practice,* 1 (3), 293-307.

Last, J. 1954. *The Young Pianist*. London: Oxford University Press.

Last, J. 1964. *Cats.* London: Oxford University Press.

Lehmann, A.C. & Ericsson, K.A. 1996. "Performance without preparation: Structure and acquisition of expert accompanying and sight-reading performance." *Psychomusicology*. 15, 1-29.

Lilly, J. C. 1972. *The Human Biocomputer*. New York: Julian Press.

Lunenfield, P. 1999. *The Digital Dialectic: New Essays On New Media*. Cambridge Massachusetts: Massachusetts Institute of Technology Press.

Marshall, C. & Rossman, G.B. 1998. *Designing Qualitative Research.* 3rd edn. London: Sage publications.

McDowall, J. 2003. *Music Technology: New Literacies In The Early Years*. Darlinghurst: Australian Computer Society.

Morrison, S. 2007. "Popular music in the class room: where to begin?" *Canadian Music Educator.* (49) p. 53.

Mouton, J. 2002. "How to succeed in your master's and doctoral studies". *A South African Guide And Resource Book*. Pretoria: Van Schaik.

Music Vision International. 2002. "Making sheet music visual and interactive." [Online] Available: http://*www.softmozart.com.* [2012, August 13].

Ng, L. 2001. Piano Lessons Made Easy Level 1. Penang: Rhythm MP.

Nintendo of America Inc. 2012. "Games for Wii". [Online] Available http://www.nintendo.com/games. [2012, August 13].

Opie, C. 2005. *Doing Educational Research: A Guide to First Time Researchers.* London: Sage Publications.

Parks, N. 2008. "Video games as reconstructionist site of learning in art education". *Journal Of Issues And Research*. 49(3), p. 235-225.

Pianolessons.com. 2009. "Learn to play the piano: A beginner's guide". [Online] Available: http://www.youtube.com/watch?v=3unOs7Oekjo. [2012, August 13].

ProDAIT. 2006. "Key Features of Action Research". *Professional Development Of Academics Involved In Teaching.* [Online] Available: http://www.prodait.org/approaches/research/how.php [2012, June 12].

Pugh, A. & Pugh, L. 1998: *Music In The Early Years*. London: Routledge.

Ramsey, G.D. 1996. "Free On-Line Piano Lessons." [Online] Available: www.gopiano.com. [2012, August 13].

Reddy, C.F. 1911. *Pianoforte Playing: On Its Technical And Aesthetic Sides.* London: Joseph Williams.

Ricci, K.E., Salas, E. & Cannon-Bowers, J.A. 1996. "Do computer-based games facilitate knowledge acquisition and retention?" *Military Psychology.* 8(4), 295-307.

Richards, M. & Light, P. (Eds). 1986. *Children Of Social Worlds.* Cambridge: Polity Press.

Rideout, V., Vandewater, E. & Wartella, A. 2003. "Introduction: Electronic media use in the lives of infants, toddlers, and preschoolers." *American Behavioral Scientist* 48: 501-504.

Robertson, J. & Good, J. 2004. "Children's narrative development through computer game authoring." *Proceedings Of The 2004 Conference On Interaction Design And Children: Building A Community*. [Online] p. 57-64. Available: http://dl.acm.org/citation.cfm?id=1017841. [2012, August 13].

Rodgers, I. & Phillips, L. 1935. *A First Book For Little Jacks And Jills.* New York: Schirmer.

Rolfe, W. 1931. *First Music Book.* New York: Sam Fox Publishing.

Royer, R. 2012. "Supporting technology integration through action research." *The Clearing House: A Journal Of Educational Strategies, Issues And Ideas.* 85 (5), p. 233-237.

Saltzman, M. 2006. "Video games: a force for good?" *In Usa Today* [Online] Available: http://www.usatoday.com/tech/gaming/2006-08-14-video-game-goodness_x.htm. [2012, August 14].

Schaffer, H.R. 1996. *Social Development.* Oxford: Blackwell.

Shehan-Campbell, P. & Scott-Kassner, C. 1994: *Music In Childhood.* New York: Schirmer.

Siegler, R.S. & Alibali, M.W. 2005. *Children's Thinking*, 4th edition. Upper Saddle River, NJ: Prentice.

Silver, R.A. 1978. *Developing Cognitive And Creative Skills Through The Arts.* Baltimore: University Park Press.

Smith, J.K. 1983. "Quantitative versus qualitative research: An attempt to clarify the issue." *Educational Researcher.* [Online] (12)3 p.6-13. Available: http://www.jstor.org/discover/10.2307/1175144?uid=2129&uid=2&uid=70&uid=4&sid=21100979833153. [2012, August 13].

Snyder, I., Angus, I. & Sutherland-Smith, W. 2002. "Building equitable literature home and school computer-mediated literacy practices and disadvantages." *Cambridge Journal Of Education.* 32 (3) p. 367-83.

Swanwick, K. 1988: *Music, Mind And Education.* New York: Routledge.

Swanwick, K. 1994. *Musical Knowledge: Intuition, Analysis And Music Education*. 2003 edn. New York: Routledge.

Swanwick, K. 1999. *Teaching Music Musically*. New York: Routledge.

Tarnowski, S.M. 1999. "Musical Play and Young Children" *Music Educators Journal,* (86) p. 26.

Taylor, K. 1996. *Principles Of Piano Technique And Interpretation*. Great Britain: Novello.

The Entertainment Software Association. 2012. "Games: Improving Education." [Online] Available: http://www.theesa.com/gamesindailylife/education.asp. [2012, August 13].

The Learning Company. 1996. "Reader rabbit 1. Age 4-7". Reader Rabbit 1 Gameplay. YouTube. [Online] 7:45. Available: http://www.youtube.com/watch?v=iU4Z5qLmo6U. [2012, August 13].

The Reader's Digest Association. (n.d.) *The ABC's Of The Human Mind. A Family Answer Book.* New York: Inc. The Reader's Digest.

Thompson, J. 1996. *The Easiest Piano Course.* Kentucky: Willis Music.

Trinka, J. (n.d.) "The Kodály approach". *The Alliance For Active Music Making* [Online]. Available: http://www.allianceamm.org/resources_elem_Kodaly.html [2012, August 13].

Trister Dodge, D., Colker, L.J. & Heroman, C. 2002. "The creative curriculum for preschool." 4th edn. Lewisville: Gryphon House. [Online] Available: http://encompassnw.org/DownFiles/DL34/CC4_Ch1_exrpt.pdf [2012, August 12].

Van Breda, C. Telephone interview. [2012, June 15].

Vygotsky, L.S. 1978. *Mind In Society: The Development of Higher Psychological Processes.* Cambridge, MA: Harvard University Press.

Vygotsky, L.S. 1986. *Thought And Language.* Cambridge: MIT Press.

Woodhead, M., Faulkner, D. & Littleton, K. (Eds). 1998. *Cultural Worlds Of Early Childhood.* London: Routledge.

Woodhead, M. 2006. "Changing perspectives on early childhood: theory, research and policy." *Background paper prepared for the Education for All Global monitoring Report 2007 Strong foundations: early childhood care and education.* Paris: UNESCO.

Warschauer, M. 2003. *Technology And Social Inclusion: Rethinking The Digital Divide.* Cambridge: MIT Press.

Watermann, F. 1983*. On Piano Teaching And Performing.* London: Faber Music.

Webster, P. 1998. "Composition software and issues surrounding its use in research settings with young children." *Psycho-Musicology.* 8 (2) p.163-169.

Webster, P. 1998. "Young children and music technology." *Research Studies In Music Education.* (11) p. 61-76.

Weigel, M. & Heikkinen K. 2007. "Developing minds and digital media: Habits of mind in the YouTube era." *GoodWork® Project Report Series, Number 51*. [Online] Avaliable:http://www.goodworkproject.org/wp-content/uploads/2010/10/No-51-Developing-Minds-with-Digital-Media.pdf. [2012, November 24].

Weiten, W. 2001. *Psychology: Themes And Variations*, California: Brooks & Cole.

Whiteside, A. 1997. *On Piano Playing*. Portland: Oregon.

Woolls, G. 1974. *Begin By Die Begin.* Bellville: Bencor.

Young, S. & Glover, J. 1998. *Music In The Early Years*. London: Falmer Press.

Zebrakeysonline. 2009. *"*Piano lessons for beginners." [Online] Available: http://www.youtube.com/user/zebrakeysonline. [2012, August 13].

Appendix A:

To: Jenny Lobban
Subject: Letter to parents

ST JOHN'S COLLEGE
EDUCATION WITH INTEGRITY

Dear Headmistress

I would like to thank you for the opportunity to chat to you the other day about possible students taking part in a pilot study to ascertain if they show interest in music lessons. As I mentioned the study will form part of the Masters Research project. I am currently the head of the piano department at St John's College. I am in the process of investigating if there is value in using a computer music game when teaching young children to play the piano.

I will use the group classes to stimulate the children over a term's period using computers as stimulus to answer my research question: "Can the computer be used as a teaching aid in the piano studios?"
The students will play educational computer games and have group stimulus till they are ready to move on to individual piano lessons. As individual children show readiness to move on to individual lessons they will be allocated a piano teacher.

Please note that all data obtained from this study will remain anonymous. The outcome will be treated as confidential in that it will strictly be used for completion of this academic degree, or possible future academic papers and conferences.

The students will have the option to withdraw from the project at any point of time seeing that it is entirely voluntary.

I hereby request your permission to invite the students to participate in the following term.

Regards

Ilse Myburgh
Head of Piano
St John's College

Appendix B

ST JOHN'S PRE-PREPARATORY SCHOOL

TO WHOM IT MAY CONCERN

RE: **APPLICATION TO THE HUMAN RESEARCH ETHICS COMMITTEE FOR CLEARANCE OF RESEARCH INVOLVING HUMAN SUBJECTS.**

As Headmistress of St John's Pre Preparatory School, I grant permission for pupils to be a part of the pilot study for Miss Myburgh's research project and that she will be the guardian throughout this experiment.

Yours faithfully,

MRS H POPPLEWELL
HEADMISTRESS

Appendix C:

1 February 2011

To whom it may concern

I hereby grant Ilsa Myburgh permission to work with the three to four year old children who attend The Bridge Nursery School.

She will use the information gathered towards her Master's Degree.

Yours sincerely

Jenny Lobban
Headmistress

Appendix D:

ST JOHN'S COLLEGE

1 February 2011

Dear Parent

I am currently enrolled for a MMus degree at the University of Witwatersrand. In order to complete my degree I have to complete the following research project:

Investigating the value a *computer game as introduction to piano learning for developing sight-reading skills in young beginner piano student.*

I hereby invite you to allow your child, to participate in this study. Because this study is voluntary he/she may withdraw at any point. The Headmistress has given consent that this research may be done at your son's school and she will oversee the project.

Ilse Myburgh
Head of Piano
St John's College
myburgh@sjc.co.za

I hereby agree/disagree for my child to participate in this study.

Name of child: _____

Parent/Guardian name: _____

Parent/Guardian signature: _____

Appendix E

The Game