The Use of Garage Band within the PYP Curriculum – An Investigation of the British International School in Thailand

Mario Maxwell Müller

Doctoral Candidate, Music Department, University of Pretoria, South Africa

Abstract: **This research paper aims to evaluate and confirm that through the use of Garage Band within the PYP Curriculum one can foster a passion and interest for music composition. Using music technology as an effective tool can enhance the PYP curriculum within a British International School. The focus of this research concentrated on St Andrews International School in Thailand where several learners in Grade 6 were interviewed through means of action research. This is a qualitative study valuable for music educators at international schools, who intend to use music technology and Garage Band in the near future. This program allowed learners to be creative and experiment with different sounds and textures, adding various instruments and using loops to create several compositions. The PYP programme allowed teachers to incorporate music technology into their curriculum, which meant that learners could be innovative and explore different elements of music.**

Keywords: **Howard Gardner, Garage Band, intelligence, melody, musical ability, musical aptitude, Pattaya, pattern, pitch, PYP- programme, rhythm, tonal, textures, Thailand.**

I. INTRODUCTION

As the head of the music department at St. Andrews, a British International School in Thailand, the researcher observed that most of the music learners in the Primary School were readily able to compose with ease without any prior knowledge of composition. The researcher has also noticed that they all had an excellent theoretical music background. I made a study of the curriculum, which the learners were exposed to since their childhood in the primary school, but could not find any relevant material linked to the composition, it's form, structure or analysis. Furthermore, having had conversations with colleagues in the early years' department, it was established that the music learners were very creative and possessed fine motor and cognitive skills. The school has students from forty-four nationalities studying co-operatively in a multi-cultural educational system, "structured according to the benchmarks set by the Dutch Government" (www.standrewsrayong.com).

Following a report by Mr Andrew Harrison the head teacher since 2005 who stated:

> *St. Andrews International School, Green Valley is a very unique school. We located on the outskirts of Pattaya in the Eastern Seaboard region of Thailand. With a population of over 460 students, from over 44 nationalities, we have a strong community family feel while still being able to offer the opportunities and diversity of a larger school. We provide a challenging and broad International Curriculum based upon the best of the English National Curriculum and the IBO programmes. Our curriculum has been tailored to reflect the needs of our diversity student body from Nursery (2 year olds) up to Year 13 (18 year olds). In 2014 we are seeking authorisation to deliver the Primary Years Programme (PYP) to our primary students, to complement the IGCSE courses and IBO (International Baccalaureate Diploma in Year 12 and 13) Diploma offering in our Secondary School… The school*

also operates a Dutch stream, structured according to the benchmarks set by the Dutch Government and Inspector of Education (www.standrewsrayong.com) .

Mathematics, Science and English are all core (compulsory) subjects, especially at Primary level according to British National Curriculum (NC) (DFES, www.education.gov.uk). In the primary school music is taught with rigid guidelines to all learners in Key stage 2 (year 5 – 6) (DFES, www.education.gov.uk). Technology plays a pivotal role in the development of a child's music abilities. This raised many questions to the researcher leading to whether a child who showed music abilities where remarkable and excellent composers through the use of technology? A child should display a level of intelligence for understanding the theoretical aspect of music as outlined and discussed by Gordon (2003: 374).

Learners who use technology today can steadfast themselves through the creation of various compositions based on different drums sequences, instruments and loops. Can computerized music creation software motivate and enhance learners' music abilities and compositional skills? The purpose of this action research project was to evaluate the feasibility of using Apple's Garage Band software as an effective tool to motivate learners in year 6 to compose? Garage Band is a music-editing and recording software programme, which allows learners to create, edit and manipulate recorded sounds to create their own music without having to fully master instruments (Char, 2008; Hopkins, nd).

II. BACKGROUND

The basic aim of research is often to learn to understand phenomena. Karma (2007:82) noted:

> *A satisfactory combination of homogeneity on the one hand and real-world validity on the other could be reached by defining musical aptitude as the ability to hear patterns in sets of sounds, that is, auditory structuring ability.*

Karma (2007) also draws attention to criticism of definitions of musical aptitude and consequently musical aptitude tests. According to Choksy (2003:6), tests often have very low validity or do not measure musical aptitude at all. Gembris (1997) discusses three phases in the definition of musicality. The first phase is the phenomenological approach, the main trend in the 20th century, although traces of it are present in the 21st century. The second phase, the psychometric approach, was most dominant during the 20th century. The main interests were objective definitions of musicality and standardized tests to measure it. The third phase refers to the musical meaning approach, this being the most important approach recognised today.

Musical aptitude tests have a history of over 85 years of refinement and development and most measure discrimination skills. The first test that was released was "The Seashore Measures of Musical Talents" in 1919. The Advanced Measures of Music Audiation Test (AMMA; Gordon 1989), the Bentley Test (BT; Bentley 1966), the Montreal Battery of Evaluation of Amusia (MBEA; Peretz et al 2003), the Karma musical aptitude test (KMAT; Karma 1993) and the Distorted Tunes Test (DTT; Drayna et al 2001) all have their own specific criteria and ways of defining musical aptitude. The test developed by Bentley examines pitch discrimination ability, tonal memory, chord analysis and rhythmic memory (Milovanov 2009:8). The Seashore test considers musicality to be an entity emerging from relatively independent sub-skills organised according to the different sound parameters and cognitive demands (for example the pitch-discrimination accuracy of musical notes versus the memory process involved for the identification of different pitches). Finally Karma (1993) developed a test that considers musicality to be more a general ability to structure sound in order cognitively (Milovanov 2009:8-9). Milovanov (2009:7) further stated:

> *Terminological uncertainty can be sometimes confusing or even misleading in the field musicality research. Terms, such as musical capacity, musical talent, musical aptitude and musical ability are often discussed and used as synonymously with the term musicality, which they actually are not.*

Milovanov (2009:14) concluded that:

> *Musical aptitude and music skills have often been connected to other cognitive skills, such as linguistic skills, cognitive development, motor abilities, social skills, and the ability to express oneself. Several correlative studies have shown that, on average, participants with musical aptitude perform better in many fields.*

The researcher agreed with Milovanov and other researchers (Trainor 2005; Trehub & Hannon 2006; Hannon & Trainor 2007) that most individuals acquire a basic musical competence through everyday exposure to music during their development. The term musicality can be vague and measuring musical aptitude can be problematic.

In September 2005, Lorraine France Gilleece, a student at the University of Dublin, completed her DPhil entitled An Empirical Investigation of the Association between Musical Aptitude and Foreign Language Aptitude. Gilleece's study focussed on the relationship between musical ability and linguistic ability, especially in relation to second language acquisition. Gilleece selected a sample of 149 subjects (students) who completed the Bentley Measure of Musical Aptitude Test (BMMAT) and a language aptitude test. Results revealed that within both experiments a significant relationship existed between music and language aptitude, independent of general intelligence. Gilleece focussed on the difference between music and language as highlighted in the research of Lerdahl and Jackendoff (1983) by attempting to analyse music using transformational-generative grammar (TGG) with an approach more commonly associated with linguistics (Gilleece 2005:8).

A connection co-existed between music and language which has historically aroused much interest and speculation (Gilleece 2005: 13). Assimilations between language and music are closely related to culture (Gilleece 2005: 15). Rousseau (1998: 321) highlights the difficulty in appreciating music which is unfamiliar in a particular culture, and states that "the most beautiful songs to our taste will always only indifferently touch an ear that is not at all accustomed to them." Some theorists agree with the view that musical meaning is widely determined by cultural convention (Blacking, 1973:29; Walker, 1996:51). The empirical study of Balkwill and Thompson (1999:45) reveals that emotions in music are communicated through an amalgamation of universal and cultural cues.

A study by Ki-Boem Jang, a professor in the Department of Music Education at Seoul National University of Education in Korea, referred to 'musical abilities' as a learners' ability with regard to five elements of music: rhythm, melody, dynamics, timbre and tempo. Jang used the Korean Music Aptitude Profile (KoMAP). The study examined the effect of musical ability on both the behavioural and the academic development of school children. With reference to academic development, the study examined achievements in mathematics, while in the behavioural field the school report was used which focused on the following variables: responsibility, assiduity, co-operation, creativity, social abilities and cheerfulness (Jang 2000:3).

Jang's study was conducted over a period of 15 months and included 118 subjects of the Sangwol elementary school in Seoul. His findings were that a positive relationship existed between musical ability and scores in mathematics. Overall the groups with a higher level of music ability showed better behavioural traits, including co-operation, creativity and cheerfulness. Similar abilities in tempo showed a positive relationship toward assiduity, responsibility and creativity. Abilities in timbre showed a positive relationship with assiduity, co-operation, creativity and social behaviour. Only melody had no positive correlation with behavioural traits, although it did show a positive relationship towards high scores in mathematics (Jang 2000:5). Jang's studies, and that of Gilleece, are of particular interest to me in my research.

To envisage composition, learners must have some level of music aptitude and skills? Many learners have the music abilities and music aptitude as outlined by several researchers (Buttall, 2007; Drake, 1954; Gilleece, 2005; Gordon, 1965, 1967a, 1989a, 2003; Hankinson, Challis & Edwards, 1999; Humphreys, 1998; Jang, 2000; Karma, 2007; Milovanov, 2009; Müller, 2012; Seashore, 1919, 1960; White, 1931 and Wing, 1948). When one defines musical aptitude according to the Gordon Institute for Music Learning (GIML), it is best described as the potential or capacity for musical achievement (Gordon, 2003: 372). The researcher would like to complete an action research project to investigate whether using Garage Band program can enhance these musical abilities and compositional skills. Many researchers (Bamberger, 1991; Deliege & Sloboda, 1996; Hargreaves, 1986; Hargreaves & North, 2001 and Sloboda, 1995) have contributed to the literature on musical development. When a pupil compose he needs to have some musical background whether he/she was exposed to various rhythmic patterns, use of different instrumentations or even phrase structures and how to use melodies and countermelodies. Part of the PYP programme is to allow learners to express themselves a philosophy and core fundamental of this teaching principle.

Webster and Hickey (2006: 375) stated:

> There has been a steady interest in children's musical growth and development from within music education and music psychology circles for many years. Paralleling this has been the substantial development of software and hardware, which have helped in the study of musical developments. What has rarely been considered is how advances in music technology might help us practically support the actual developmental understanding of music in children.

The statement above confirms that there has been a growth of several software and hardware to support the musical development of students. However; it also iterates how these can be used as an effective tool to support the developmental understanding of children.

Since 1984 to 2016 there has been a variety of different music technology programs readily available on the market for students to use. Band-in-a-box was the first commercial program, which provided simulation, automated accompaniments for improvisation and creative exploration software. The first music theory/aural skills programs to incorporate options for learners and teachers focusing on the individual learners' needs was Practica Musica. Finale and Sibelius was used for the creation of notations and compositions. Cubase and Performer are used for sequencing purposes allowing arrangers and composers to develop scores more effectively for commercial music, jingles, television advertisements, film and various arrangements for orchestra and small ensembles. The most interactive music theory programme was Music Ace I and II, which came along with guided instruction to support learners to understand music theory and develop their aural skills (through the visual stimulations of using animation) and several games. Smart Music provided accompaniment support for instrumentalist and vocalist and assisted with the teaching of music intonation and improving a learners' sight reading abilities. For recording purposes and digital audio recording software, Audacity and Sound Forge was used to record and process sound with a variety of special effects readily available for everyone to use. These allowed musicians and teachers to burn audio CD through using Pro Tools and Audition. It would be interesting to know how many teachers in International Schools use these programs as an effective tool to promote opportunities for learners to compose and be creative (Webster and Hickey, 2006: 381 – 382).

III.   LITERATURE REVIEW

The literature to be reviewed will focus on the theory of intelligence, musical abilities and the PYP programme. This section will be divided into two subsections: the first will cover the area of intelligence and musical ability and the second will focus on the philosophy of the PYP programme especially within the Arts and Music. The aim of the literature review is to find material to assist in the interpretation of the data that will be analysed, compared to Gilleece's 2006 and Jang's 2000 findings.

IV.   INTELLIGENCE AND MUSICAL ABILITY

When one refers to the word "intelligence" one evaluates the perceptions and interpretations of various theories. Howard Gardner (1999a:180-181) reflects on multiple intelligences and the impact on thinking and practice in education in the USA. He suggested:

> *I want my children to understand the world, but not just because the world is fascinating and the human mind is curious. I want them to understand it so that they will be positioned to make it a better place. Knowledge is not the same as morality, but we need to understand if we are to avoid past mistakes and move in productive directions.*

The researcher agreed with the above statement. Gardner's framework (1999b:41-43) includes linguistic intelligence, logical-mathematical intelligence, musical intelligence, bodily-kinaesthetic intelligences, spatial intelligence, interpersonal intelligence and finally intrapersonal intelligences. Gardner (1999b:44-45) argues:

> *The theory is an account of human cognition in its fullness. The intelligences provided 'a new definition of human nature, cognitively speaking'. Human beings are organisms who possess a basic set of intelligences ... People have a unique blend of intelligences. Howard Gardner argues that the big challenge facing the deployment of human resources 'is how to best take advantage of the uniqueness conferred on us as a species exhibiting several intelligences'.*

Reynolds and Hyun (2004:18) have researched teachers' understanding of musical aptitude. They examined how teachers select, suspend, check, regroup and transform their understanding when measuring the overall musical aptitude of their students with a focus on how to obtain standardized musical aptitude test scores from the participants. The study involved ten classroom teachers from South Korea and the USA who elaborated on their experiences with a final individual interview.

Boyle (1992:247) suggests the following:

> *That teachers differ in their understanding of music constructs such as talent, ability, musicality, and aptitude is not surprising. Researchers and teachers would do well to achieve consensus about music constructs, their measurement, and the use of results, because testing offers objective bases for instructional, curriculum, and program changes that take into account students' individual differences.*

Reynolds and Hyun (2004:18) confirm that objective measurement of innate music potential is relevant to promoting optimal music learning for children, agreeing with Gordon's definition of musical aptitude focussing on the potential to achieve overall in music (Gordon 2003:372). Most researchers (Auh 1992; Brown 1928; Cain 1960; Christy 1956; Culver 1965; Doxey & Wright 1990; Drake 1949; Forsythe 1984; Gaston 1957; Reynolds & Hyun 2004) concur that there is a direct relationship between a teacher's assessment of students' talents and the test scores of students' ability or aptitude. Researchers (Boyle 1992; Boyle & Radocy 1987; Gaw 1995; Gordon 1967b) have confirmed that teachers are also influenced by non-musical factors such as students' temperaments, attitudes, personalities or interests. I disagree, as my colleagues and I find ourselves predisposed by musical factors when assessing our own students.

Evaluating the research of Buttall (2007), one can conclude that in many cases musical precocity co-exists with abilities in mathematics or in languages. Buttall (2007:3) argues that there is a relationship between musical ability and intellectual ability. Wing (1948:78) and Edmunds (1960:40) both noted more than half a century ago that a good agreement existed between low intelligences and students' low scores in tests of musical ability whereas a high IQ was always accompanied by a high score for musical aptitude. Further research developments have shown that the relationship of aspects of musical ability to general intelligence is by no means consistent. To note but three aspects: Burt (1990:33) focussed on correlations between intelligence and pitch discrimination; Buttall's research (2007) confirms that students with a musical background have an advantage overall when it comes to learning a foreign language; there is a connection between mathematical aptitude and musical abilities (Zhan 2008:1).

Positive correlations are found between measures of music ability and other cognitive aptitudes. The study of musical cognition has long fascinated researchers (Gaab & Schlaug 2003; Gaser & Schlaug 2003; Zatorre et al 1998, Zatorre 2003). One of the aims and findings of the research of Norton, Winner, Cronin, Overy, Lee and Schlaug (2005: 124) was to determine whether children who choose to participate in music training performed at a higher level than those who did not seek training on any cognitive outcome previously found to be enhanced by, or associated with, music training.

V. PYP PROGRAMME

The philosophy of PYP is deeply held about the nature of international education. The mission statement of the International Baccalaureate programme stated:

> *The International Baccalaureate aims to develop inquiring, knowledgeable and caring young people who help to create a better and more peaceful word through intercultural understanding and respect. To this end the organization works with schools, government and international organizations to develop challenging programmes of international education and rigorous assessment (www.ibo.org/programmes/primary-years-programme).*

The PYP programme encourages International – mindedness and allows learners from different backgrounds and experiences to join. What is an internationally minded person? It is someone who demonstrates the attributes of the IB learner profile.

The basic aim of all IB Programmes is to develop internationally minded people, who recognizing their common humanity and share guardianship of the planet, to create a better and more peaceful world.

IB students strive towards learners to be:

- **Inquirers:** - They develop their natural curiosity, they acquire the skills necessary to conduct inquire and research and show independence in learning. They actively enjoy learning and this love of learning will be sustained throughout their lives

- **Knowledgeable:** - They explore concepts, ideas and issues that have local and global significance. In doing so, they acquire in-depth knowledge and develop understanding across a broad and balanced range of disciplines.

- **Thinkers:** - They exercise initiative in applying thinking skills critically and creatively to recognize and approach complex problems, and make reasoned, ethical decisions

- **Communicators:** - They understand and express ideas and information confidently and creatively in more than one language and in a variety of modes of communication. They work effectively and willing in collaboration with others

- **Principled:** - They act with integrity and honesty, with a strong sense of fairness, justice and respect for dignity of the individual, groups and communities. They take responsibility for their own actions and the consequences that accompany them

- **Open-minded:** - They understand and appreciate their own cultures and personal histories, and are open to the perspectives, values and traditions of other individuals and communities. They are accustomed to seeking and evaluating a range of points of view, and are willing to grow from the experience

- **Caring:** - They show empathy, compassion and respect towards the needs and feelings of others. They have a personal commitment to service, and act to make a positive difference to the lives of others and to the environment

- **Risk-takers:** - They approach unfamiliar situations and uncertainty with courage and forethought and have the independence of spirits to explore new roles, ideas and strategies. They are brave and articulate in defending their beliefs

- **Balanced:** - They understand the importance of intellectual, physical and emotional balance to achieve personal well-being for themselves and others

- **Reflective:** - They give thoughtful consideration to their own learning and experience. They are able to access and understand their strength and limitations in order to support their learning and personal development (https://tecnosanfran.wikispaces.com/file/view/Making+the+PYP+Happen.pdf) .

The PYP programme is designed for learners aged 3 to 12. It focuses on the development of the whole child as an independent inquirer, both in the classroom and in the real world outside. The whole framework is guided by six transdisciplinary themes of global significance, explore using knowledge and skills derived from all six subject areas, as well with transdisciplinary skills emphasising inquiry based learning (Ibid).

The six subject areas:

- Language

- Mathematics

- Science

- Social Studies

- Arts (Music, Art and Drama)

- Personal, social and physical education

The six trans disciplinary themes covered are:

- **Who we are**: - Inquiry into the nature of the self-beliefs, values; person, mental, social and spiritual health; human relationships including families, friends, communities, cultures, rights and responsibilities and what it means to be human.

- **Where we are in place and time**: - Inquire into orientation in place and time; personal histories, homes and journeys, explorations and migrations of humankind and the relationship between and the interconnectedness of individuals and civilizations from a local and global perspective

- **How we express ourselves**: - Inquiry into the ways in which we discover and express ideas, feelings, nature, culture, beliefs and values, the ways in which we reflect on, extend and enjoy or creativity; our appreciation of the aesthetics

- **How the world works**: - Inquiry into the natural world and it's laws, the interaction between the natural world and human societies, how humans use their understanding of scientific principles, the impact of scientific and technological advance on society and the environment

- **How we organize ourselves**: - Inquiry into the interconnectedness of human-made systems and communities; the function and structure of organizations; societal decision-making; economic activities and their impact on humankind and the environment

- **Sharing the planet**: - Inquiry into rights and responsibilities in the struggle to share finite resources with other people and other living things, communities and the relationship within and between them; access to equal opportunities and lastly peace and conflict resolution (Ibid:12).

PYP within the Arts

The arts programme plans are integral part of PYP as this is where the learners explore and construct a sense of self and develop and understanding of the world around them. The arts programme allows all learners with a wide range of opportunities to respond to their experiences and engage with historical and cultural perspectives. These allow all the learners to articulate their thoughts in new ways through a variety of media and technologies. Work in arts is thus a ways of conveying meaning, sharing cultures, developing one's sense of self and expanding knowledge. Opportunities are created for learners to reflect on aesthetic experience, to engage the imagination and explore was is uncertain (Ibid:125).

PYP within Music

In music all learners have the opportunity to communicate in ways that go beyond their oral language abilities. Music stimulates, soothes and comforts us; these allow us to communicate in a unique way. Learners are given opportunities to analyse sounds, compose, explore body music, harmonize, listen to various types of music, play instruments, sing, learn about notation, read music, complete song writing and record their own music. In creating, learners use their imagination and musical experience to organize sounds into forms that communicate their specific ideas or moods. In responding, learners are given the opportunity to respond to different genres of music from different cultures. Through exposing learners to wide range of varied repertoire of musical styles the can begin to construct an understanding of their environment, their structures and surrounds and begin to develop personal connections with them. The PYP music classroom provides a stimulating environment that challenges students, which is always well resourced with range of music recordings, videos and instruments. Using technology and ICT can enhance learning in music allowing students to create, compose and record their own work, evaluate, observe, improve and share music through use of music files and CDs (Ibid:127).

VI.   AIMS

The purpose of this action research project was to establish whether the programme Garage Band enhanced the musical skills and abilities of learners to compose in the Year 6 class at an International School in Rayong, Thailand. The researcher conducted a pilot study at the school, which was based over a six month's period. Learners in Year 6 were allocated two lessons per week, which allowed the researcher to conduct field research over 48 sessions. The information gathered allowed future researchers to use the information and research conducted about music technology and the programme Garage Band. The researcher conducted a qualitative study to enlighten other teachers within the International sector to what an effective tool this programme could be used to encourage and foster an interest for composition but at the same time develop learners' musical abilities.

VII.   RESEARCH METHODOLOGY

This study was largely empirical in nature; the researcher relied on the information provided through the questionnaires, interviews and observations to explore and answer the research questions. However, the evaluation included research methods that are qualitative as described by Mouton (2001:196). The test design had three phases: the first gathered data from a total sample of 32 learners that was in Year 6 for the academic year 2015. The second included interviews, which was recorded by all 32 learners. The last phase included the performances of 32 learners, randomly selected, practically demonstrating their musical abilities and skills. Each learner needed approximately 30 minutes per session. The first phase sample collected more in-depth data according to the qualitative method of research. Of the sample of the second phase, 100% included interviews with all 32 students. The last phase included the general observations (musical performances of these 32learners) which make this research predominantly of an empirical nature. This study targeted learners in Grade 6 aged 10-13. The data collection was completed with detailed questionnaires based on questions

relating to the use of Garage Band and music technology. Data was analysed under the sections age, gender, use of technology and musicality. The reason for this was because students of different ages, genders and cultural backgrounds learn at a different paces' to their peers (McLeod 2007:1).

VIII.   FINDINGS

The data revealed that learners were very keen to learn new concepts in the classroom using the program Garage Band, which was significant to explore through the PYP music programme. Some of them were very creative and created their own compositions, which confirms that technology and using Garage Band can enhance the musical abilities and compositional skills of learners. The analysis of the results (see figure 1) revealed that predominantly there were more boys (58%) then girls (42%) in the music classes combined.
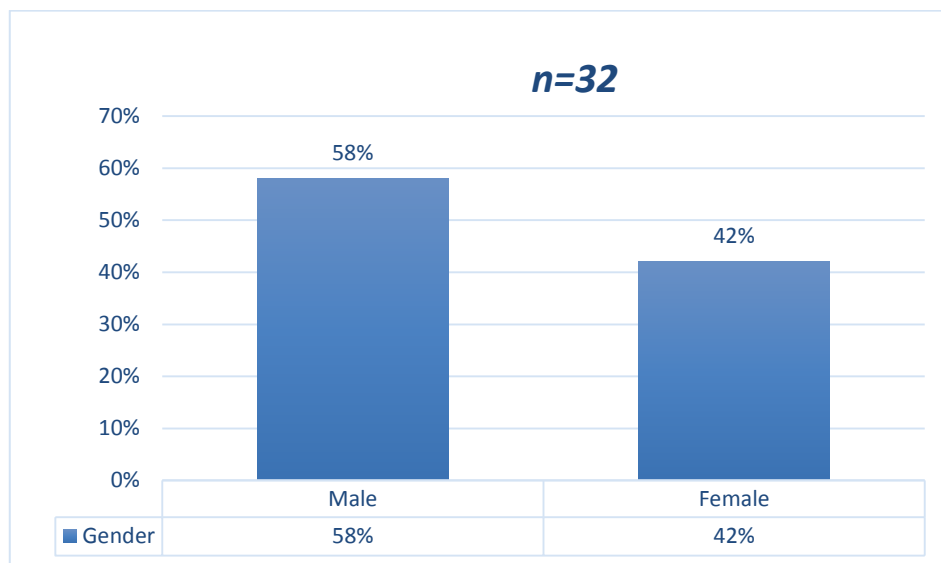

Figure 1 – Gender scale

Their previous musical backgrounds varied from the various instruments (see figure 2) with 50% of the learners playing string instruments, these could vary from the violin to the acoustic and electric guitars, 28% performed on percussion instruments, 16% played woodwind instruments with the flute being the most popular instrument, the least most popular instruments that were being played were the brass instruments with 6% of the students having had tuition previously offered to them.
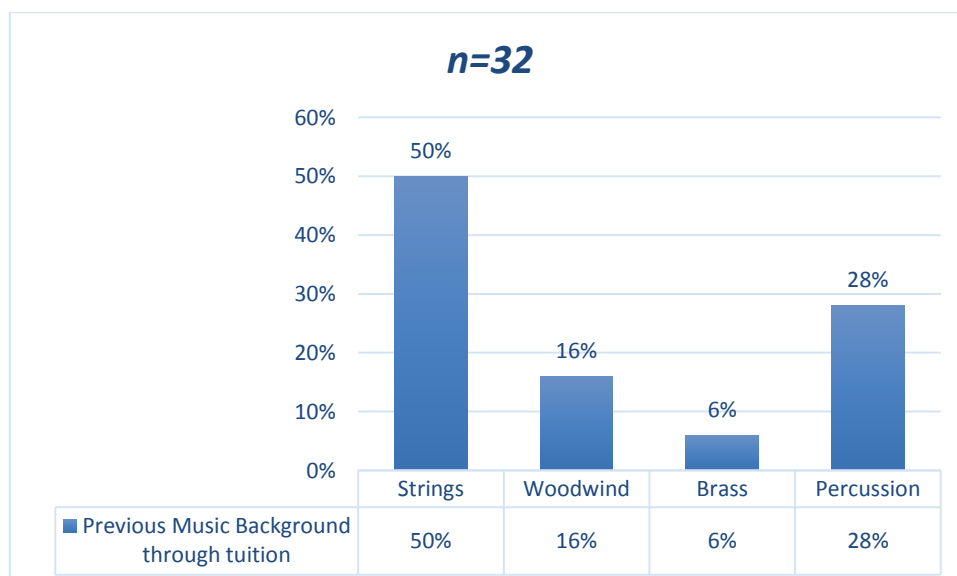

Figure 2 – Musical background and previous experience

Most of the learners that participated in this study (see figure 3) ages varied with 72% being, 11 Years of age followed by 22% of them being 12 years old and 6% being 10 years of age when this study and research were completed.
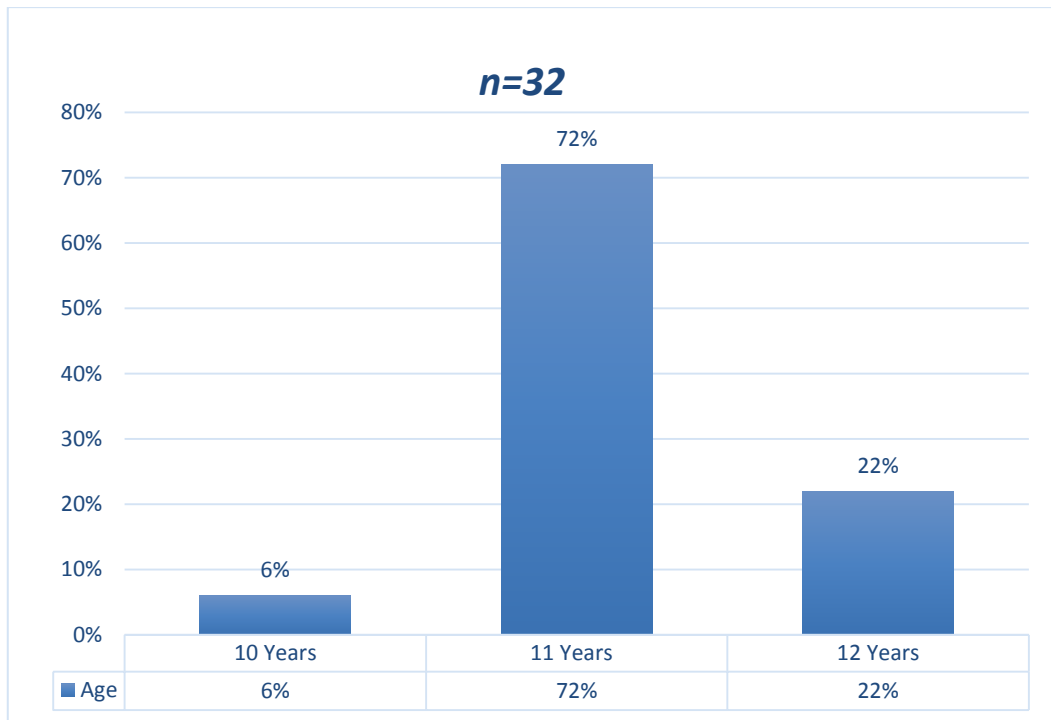

Figure 3 – Age levels

The programs that were most frequently used (see figure 4) when composing was Garage Band being in the lead by 53%, 20% of the learners used Sibelius, 19% used the Finale program and 8% was using Logic on their Apple Mac computers.
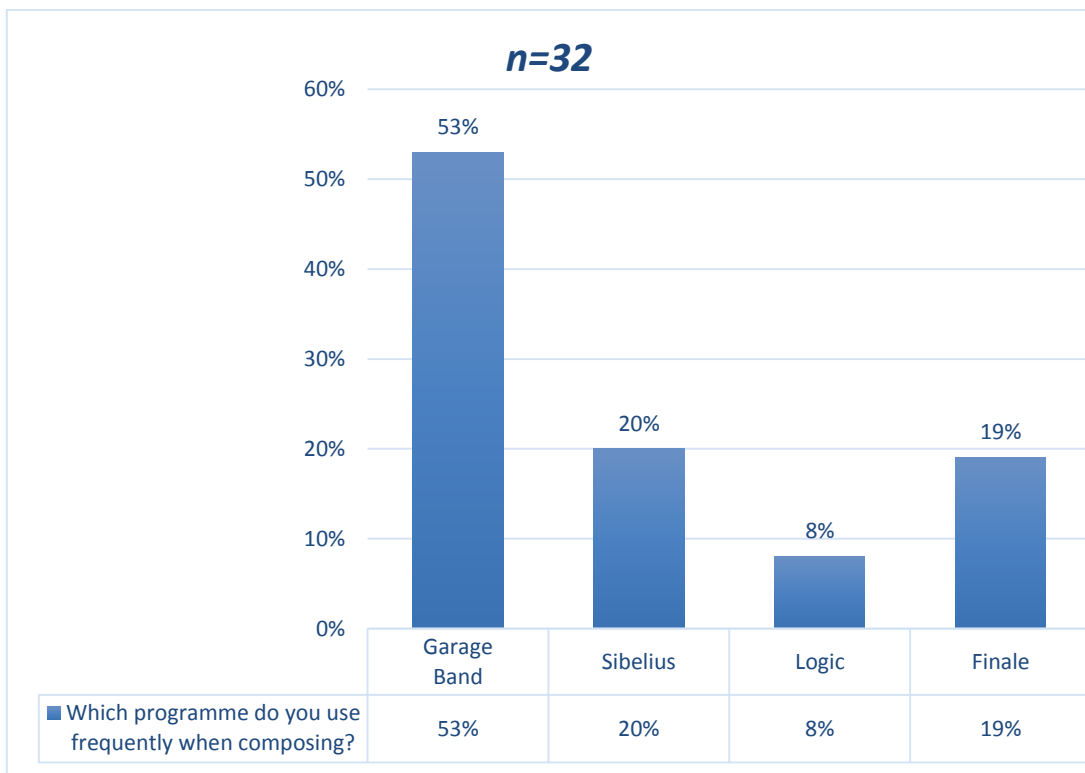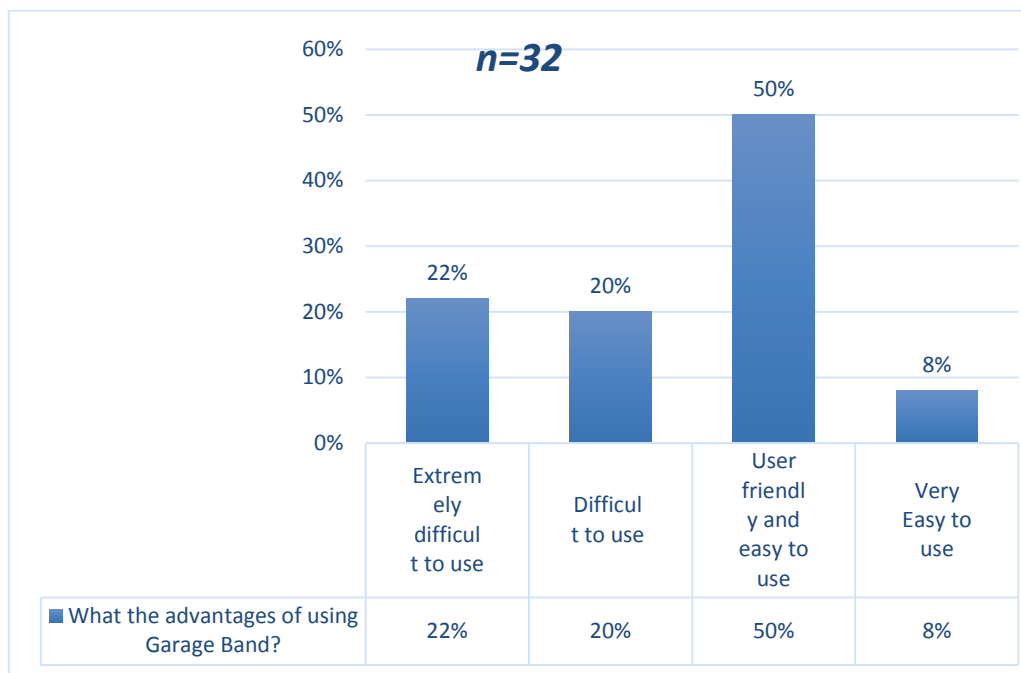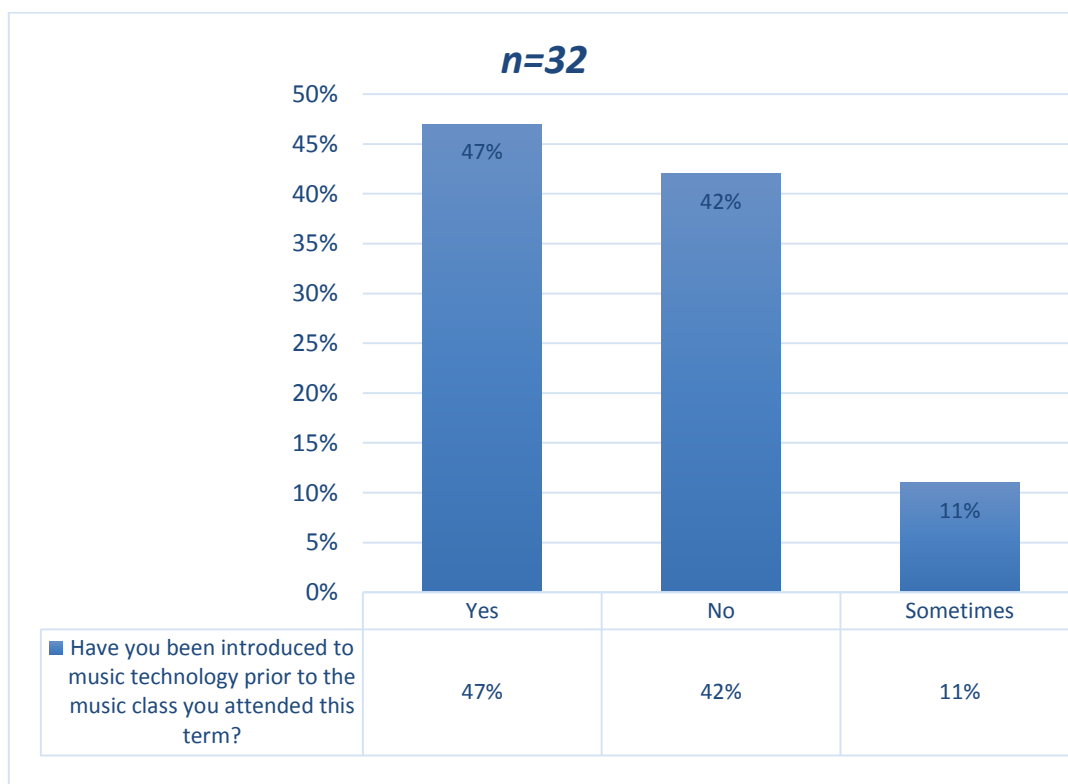

Figure 4 – Frequently used programs when composing music

n=32

|	Extremely difficult to use	Difficult to use	User friendly and easy to use	Very Easy to use
■ What the advantages of using Garage Band?	22%	20%	50%	8%

Figure 5 – Advantages of using the program Garage Band

The advantages to using Garage Band (see figure 5) was with 50% of the sample agreeing that it was user friendly and very easy to use, 22% thought that it was extremely difficult to use, 20% agreed that it was difficult to use and 8% concluded that it was very easy to use.

n=32

|	Yes	No	Sometimes
■ Have you been introduced to music technology prior to the music class you attended this term?	47%	42%	11%

Figure 6 – Experience with music technology

Most learners have been introduced to music technology (see figure 6) as 47% of the sample agreed that they were introduced to music technology prior to their music class they attended that term, 42% stated "No" and 11% of the sample agreed that "sometimes" they were previous exposed to music technology.
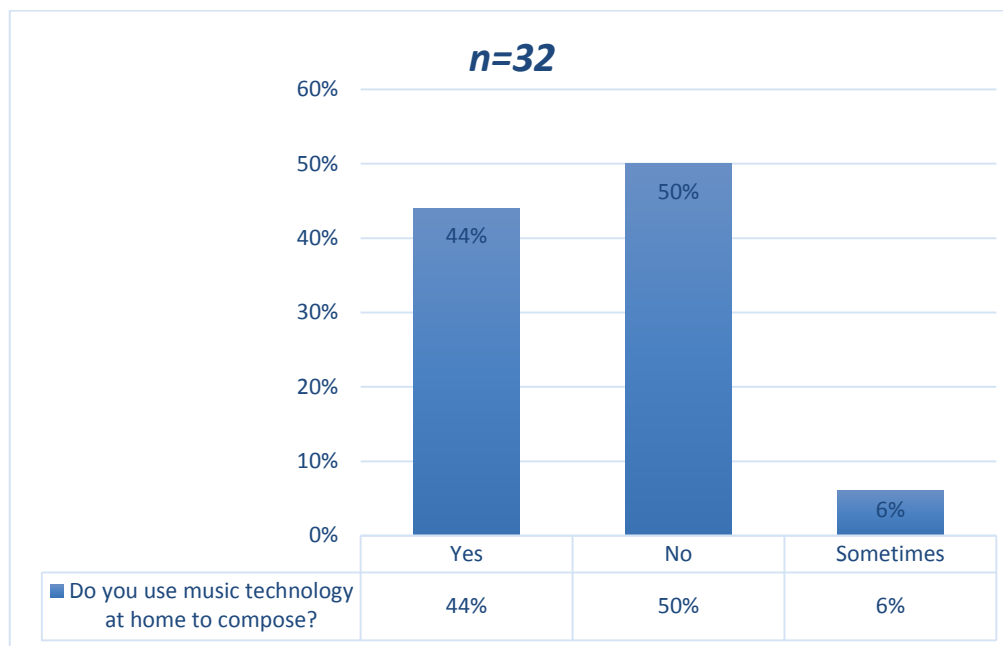
Figure 7 – Using technology to compose

It was interesting to see that 50% stated that they never used technology to compose at home (see figure 7), 44% agreed that they used technology to compose at home and 6% stated that "sometimes" they incorporated music technology in their compositions at home.
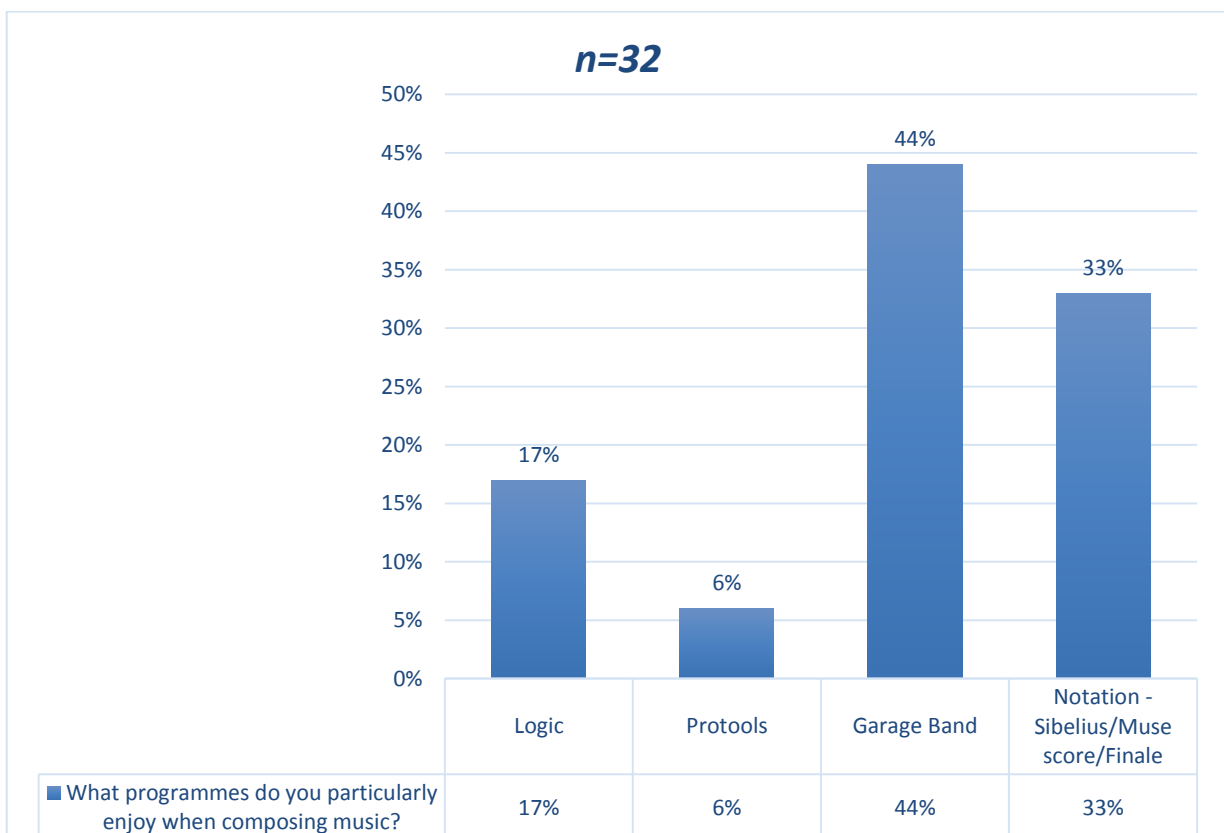
Figure 8 – Most enjoyed programs

The learners all agreed that 44% of the sample were using Garage Band (see figure 8) regularly to compose, 3% were using notation programs including Sibelius, Muse Score and Finale, 17% of the sample was using Logic and 6% were using Pro tools to complete their compositions.
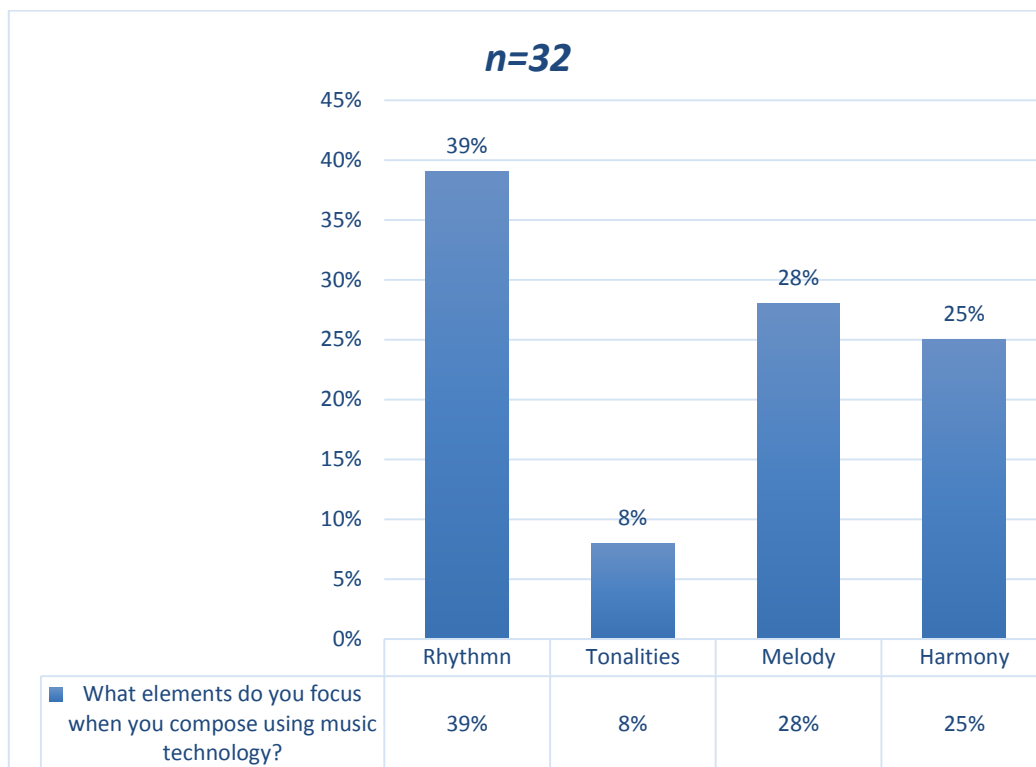
Figure 9 – Elements used when composing

The most common elements of music used by the sample for composing was 39% for rhythm, 28% for melody, 25% of the sample for harmony and 8% for tonality.

IX. CONCLUSIONS

The research that was conducted confirmed that using Garage Band enhanced the musical skills and abilities for learners to compose. This program allowed learners to be creative and experiment with different sounds and textures, adding various instruments and using loops to create several compositions. The PYP programme allowed teachers to incorporate music technology into the curriculum, which meant that learners were being creative and exploring different elements of music through using Garage Band. Differentiation for learners were made easily as everyone in the classroom were composing at different levels. Some learners were more advanced and familiar with the program then others. One learner in particular composed his own composition using solely Garage Band and incorporated various loops including modulations and various key changes to his score. The added benefit was when learners recorded their melodies they had the opportunity to look at the notational score and edit and make the necessary changes that was needed. This learner in particular won the "best original composition" for his band at an interschool rock music competition. There are many advantages using Garage Band in your music curriculum for PYP. Learners will be able to conclude the following:

• Create their own original compositions

• Be creative and add various rhythmic accompaniments to their melodies

• Experiments with textures, which could be monophonic, polyphonic or homophonic

• Explore different keys including major and minor

• Add modulations which usually starts in the tonic key then modulates to the subdominant (IV) or dominant (V) or the relative minor

• Add various structures, which could be Binary (AB), Ternary (ABA) or Rondo (ABACA)

• Experiment with various instruments including guitar, bass, double bass, violin, piano and so many more from the instrument and sound libraries

- Use the recording and edit functions to record their melodies and several tracks allowing them to explore the possibilities of improving their compositions.

This pilot study confirmed that using technology can be an effective tool in the classroom. Incorporating music technology and Garage Band into the PYP program allowed other disciplines to collaborate on topics including music and the media, literacy, history and ICT. Learners were given the opportunity to be creative and indeed they were because they enjoyed learning new experiences and being enquirers, which PYP programme encourage each learner to attain. With personal projects learners could compose on a particular theme or area of study that was being covered.

X. RECOMMENDATIONS

For teachers teaching the PYP programme in International schools there are equal benefits through incorporating music technology into their programmes. Through composing this allows learners to demonstrate their understanding of the rudiments of music theory. This is a perfect opportunity for them to show case their talents, perceptions and ideas of music understanding through experimenting with different melodies, adding accompaniments. For those who are not familiar with music theory or notation Garage Band is an excellent tool for them to use a Midi-Keyboard and play their composition in live time through a simple process of pressing the record button. For young learners this is the ideal tool to progress towards using Logic and Logic Professional software. With existing loops learners allowed opportunity to explore different instruments, textures, adding their own melodies and creating textures of their own. Garage Band allows learners to add-on Jam Pack which contains loops and software instruments grouped into several genres and styles including:

- Garage Band Jam Pack: Remix Tools

- Garage Band Jam Pack: Rhythm Section

- Garage Band Jam Pack: Symphony Orchestra

- Garage Band Jam Pack: World Music

- Garage Band Jam Pack: Voices

With several features you can record music, even sounds through audio recording, edit your own music, compose music and import music in formats including AIFF, WAV and MIDI. The best part of the program and the end each learner can export their compositions in file formats including MP3, MP4 and AIFF form to play back to their parents and share with other learners. These allows opportunities for self and peer assessments to be conducted in the music class room regularly. Each teacher using the PYP programme in International Schools should take advantage of using Garage Band in their lessons for projects and compositions. Using music technology and Garage Band will enhance their compositional skills and encourage learners to reach their full potential through musical skills and abilities. These all fosters an appreciation for music and encapsulates a level of diversity of various cultures. Teachers always fear the phenomena of integrating technology into their music lessons, without doubt I can sincerely recommend using Garage Band within your own PYP music curriculum. It encourages learners to be creative, to work either independently or within a group and explore their musical interests.

REFERENCES

[1] Auh, M. 1992. Relationships between music aptitude test scores and teacher's ratings of music aptitude for fifth-grade students. Unpublished doctoral thesis. Cleveland: Case Western Reserve University.

[2] Balkwill, L.L. & Thompson, W.F. 1999. A cross-cultural investigation of the perception of emotion in music: Psychophysical and cultural cues. Music Perception, 17(1): 43-64.

[3] Bamberger, J. 1991. The mind behind the musical ear: How children develop musical intelligence. MA: Harvard University Press.

[4] Bentley, A. (1966). Measures of musical abilities. London: Harrap.

[5] Blacking, J. 1973. How musical is man? Seattle: University of Washington Press.

[6] Boyle, D.J. 1992. Evaluation of Musical Ability. In R. Colwell (Ed), The Handbook of Research In Music Education. New York: Schirmer.

[7] Boyle, D.J. & Radocy, R.E. 1987. Measurement and evaluation of musical experiences. New York: Schirmer.

[8] Brown, A.W. 1928. The reliability and validity of Seashore Tests of Musical Talents. Journal of Applied Psychology, 12:468-476.

[9] Burt, C. 1909. Experimental Tests of General Intelligence, British Journal of Psychology, 3:94-177.

[10] Buttall, P.R. 2007. An Investigation into Musical Ability and Ability in Mathematics and Foreign Languages. [Internet] <http://www.philiprbuttall.co.uk/ChildPsychologyElective. pdf> [Accessed 20 April 2015]

[11] Cain, M.L. 1960. A comparison of the Wing Standardised Tests of Musical Intelligence with a Test of Musicality by Gaston and the Drake Musical Aptitude tests. Unpublished master's thesis. University of Kansas.

[12] Catell, J.M. & Farrand, L. 1896. Physical and Mental Measurements of the Students of Columbia University, Psychological Review, 3:636.

[13] Char, L. 2008. Using GarageBand to Motivate Students to Practice. [Internet] <https://scholarsp ace.manoa.hawaii.edu/bitstream/10125/7969/3/Lauren_TCC_final.pdf> [Accessed 19 April 2015].

[14] Choksy, L. 2003. Making music together. Paper presented at the XVI International Kodály Symposium. [Internet] <http://www.kodaly.org.au/resources/Chosky.speech.pdf> [Accessed 22 April 2015]

[15] Christy, L.J. 1956. A study of the relationship between musicality, intelligence, and achievement. Doctoral Dissertation. Indiana: Indiana University.

[16] Culver, F. 1965. A study of the Musical Aptitude Profile. Masters Dissertation, Iowa City: The University of Iowa.

[17] Deliege, I. & Sloboda, J. 1996. Musical beginnings: Origins and development of musical competence. New York: Oxford University Press.

[18] Doxey, C. & Wright, C. 1990. An exploratory study of children's music ability. Early Childhood Research Quarterly, 5:425-440.

[19] Drake, R.M. 1954. Drake Musical Aptitude Tests. Chicago: Science Research Associates.

[20] Drayna, D., Manichaikul, A., De Lange, M., Snieder, H. & Spector, T. 2001. Genetics correlates of musical pitch recognition in humans, Science, 291:1969-1971.

[21] Edmunds, C.B. 1960. Musical Ability, Intelligence and Attainment of Secondary Modern and ESN Children, Masters thesis, Leeds: Leeds University.

[22] Farrance, E. 2000. Action Research, Education Alliance at Brown University. Providence: Brown University.

[23] Forsythe, R. 1984. The development and implementation of a computerized preschool measure of music audiation. Doctoral Dissertation, Western Reserve: Case Western Reserve University.

[24] Gaab, N. & Schlaug, G. 2003. The effect of musicianship on pitch memory in performance matched groups, Neuro Report, 14:2291-2295

[25] Gardner, H. 1999a. Are there additional intelligences? The case for naturalistic, spiritual, and existential intelligences. In J. Kane (Ed.), Education, information, and transformation. p 111 - 131). Upper Saddle River, NJ.: Prentice Hall.

[26] Gardner, H. 1999b. Intelligence reframed: multiple intelligences for the 21st century. New York: New York Basic Books.

[27] Gardner, H. 2003. Multiple intelligences. New Horizons. New York: Basic Books.

[28] Gaser, C. & Schlaug, G. 2003. Brain structures differ between musicians and non-musicians. Journal of Neuroscience, 23:9240-9245.

[29] Gaston, E.T. 1957. A Test of Musicality: Manual of directions. Lawrence: Odell's Instrumental Service.

[30] Gaw, E.A. 1922. A survey of musical talent in a music school. Psychological Monographs, 31:128-156.

[31] Gembris, H. 1977. Historical phases in the definition of musicality. Psychomusicology, 16:17-25.

[32] Gilleece, L.F. 2005. An Empirical Investigation of the Association between Musical Aptitude and Foreign Language Aptitude. Doctoral thesis, Dublin: Trinity College.

[33] Gordon, E.E. 1965. Musical Aptitude Profile. Boston : Houghton Mifflin Company.

[34] Gordon, E.E. 1967a. A three-year longitudinal predictive validity study of the Musical Aptitude Profile. Iowa City: University of Iowa Press.

[35] Gordon, E.E. 1967b. The Musical Aptitude Profile, Music Educators Journal, 53(6): 52-54.

[36] Gordon, E.E. 1989. Advanced Measures of Music Audiation. Chicago: GIA. Publications.

[37] Gordon, E.E. 2003. Learning sequences in music: Skill, content, and patterns. Chicago: GIA Publications.

[38] Hankinson, J.C.K., Challis, B.P. &. Edwards, A.D.N. 1999. MAT: A Tool For Measuring Musical Ability, Technical report YCS 322. University of York: Department of Computer Science.

[39] Hannon, E.E. & Trainor, L.J. 2007. Music acquisition: Effects of Enculturation and formal training on development. Trends in Cognitive Sciences, 11, 466-472.

[40] Hargreaves, D.J. 1986. The developmental psychology of music. New York: Cambridge University Press.

[41] Hargreaves, D.J. & North, A.C. 2001. Complexity, prototypicality, familiarity, and the perception of musical quality. Psychomusicology, 17(1-2):77 – 80.

[42] Harrison, C.S. 1990. Predicting music theory grades: The relative efficiency of academic ability, music experience and musical aptitude. Journal of Research in Music Education, 38:124-137.

[43] Harrison, C.S., Asmus, E.P. & Serpe, R.T. 1994. Effects of musical aptitude, academic ability, music experience and motivation on aural skills. Journal of Research in Music Education, 42:131-144.

[44] Hauser, M.D. & McDermott, J. 2003. The evolution of the music faculty: A comparative perspective. Nature Neuroscience, 6(7):663 - 668.

[45] Hedden, S.K. 1982. Prediction of music achievement in the elementary school. Journal of Research in Music Education, 30(1):61-68.

[46] Herrnstein, R.J. 1973. I.Q. in the Meritocracy. Boston: Little, Brown.

[47] Hopkins, B. (n.d.) New software helps struggling musicians cut albums cheaply at home studios. Daily News, Los Angeles: CA.

[48] Howes, F. 1958. Music and its Meanings. London: University of London.

[49] Humphreys, J.T. 1993. Precursors of Musical Aptitude Testing: From the Greeks through the Work of Francis Galton. Journal of Research in Music Education, 41:315-27.

[50] Humphreys, J.T. 1998. Musical Aptitude Testing: From James McKeen Catell to Carl Emil Seashore, Research Studies in Music Education, 10:42-53.

[51] International Baccalaureate, 2007. A curriculum framework for international primary education. [Internet] <https://tecnosanfran.wikispaces.com/file/view/Making+the+PYP+Happen.pdf > [Accessed 17 April 2015]

[52] Jang, K-B. 2000. The effects of music abilities upon elementary students. Korea: National University of Education in Korea.

[53] Jang, K-B. & Sung-Ki, C. 2003. The Development of Music Aptitude Profile for Primary School Children in Seoul, Journal of Music Education Science, 2:8-23.

[54] Karma, K. 1982. Validating tests of musical aptitude. Psychology of Music, 10(1):33-36.

[55] Karma, K. 1993. Musikaalisuustesti. Helsinki: K.Karma (+manual 6 pp).

[56] Karma, K. 2007. Musical Aptitude Definition and Measure Validation: Ecological validation can endanger the constructs of validity of musical aptitude tests. Psychomusicology, 19(2): 79-90.

[57] Klinedinst, R.E. 1991. Predicting performance achievement and retention of fifth grade instrument students. Journal of Research in Music Education, 39(3):225-238.

[58] Lerdahl, F. & Jackendoff, R. 1983. A Generative Theory of Tonal Music. Cambridge (MA): MIT Press.

[59] Mcleod, S. 2007. Vygotsky. [Internet] <http://www.simplypsychology.org/vygotsky.html> [Accessed 20 April 2015]

[60] Milovanov, R. 2009. The Connectivity of Musical Aptitude and Foreign Language Learning Skills: Neural and Behavioural Evidence. Unpublished doctoral thesis. Finland: Painosalama, University of Turku.

[61] Mouton, J. 2002. How to succeed in your Master's & Doctoral Studies: A South African guide and resource book. Pretoria: Van Schaik.

[62] Müller, M. 2012. Music aptitude testing in a North London School. Unpublished master's theses. South Africa: University of Pretoria.

[63] Norton, A., Winner, E., Cronin, K., Overy, K., Lee, D.J. & Schlaug, G. 2005. Are there pre-existing neural, cognitive, or motoric markers for musical ability? Brain and Cognition, 59:124-134.

[64] O'Brien, R. 2001. An overview of the methodological approach of action research In Roberto Richardson (Ed.), Theory and Practice of Action Research. João Pessoa, Brazil: Universidade Federal da Paraíba. (English version) [Internet] <http://www.web.ca/~robrien/papers/arfinal.html> [Accessed 19 April 2015]

[65] Pearson, K. 1930. The Life, Letters and Labours of Francis Galton, Vol. IIIA. England: Cambridge University Press.

[66] Peretz, I. 2002. Brain Specialization for Music. Neuroscientist, 8(4):374-382.

[67] Peretz, I., Champod, A.S. & Hyde, K. 2003. Varieties of musical disorders. The Montreal Battery of Evaluation of Amusia. Annals of the New York Academy of Sciences, 999:58-75.

[68] Reynolds, M.A. & Hyun, K. 2004. Understanding Music Aptitude: Teachers' Interpretations. Research Studies in Music Education, 23:18-31.

[69] Rousseau, J.J. 1998. Essay on the origin of languages and writings related to music (J. T. Scott, Trans. Vol. 7). London: University Press of New England.

[70] Seashore, C.E. 1919. Seashore Measures of Musical Talent. New York: The Psychological Corporation.

[71] Seashore, C.E, Lewis, D. & Saetveit, J.G., 1960. Seashore Measures of Musical Talents CD, digitally remastered version by Esquef, P. 2003. Helsinki University of Technology, Finland. Assessed, 25 February 2011.

[72] Seashore, C.E., Lewis, D. & Saetveit, J.G. 1960. Seashore Measures of Musical Talents Manual, 2nd ed. New York: Psychological Corporation.

[73] Sloboda, J. 1985. The musical mind: The cognitive psychology of music. New York: Oxford University Press.

[74] Trainor, L.J. 2005. Are there critical periods of musical development? Developmental Psychobiology, 46:262-278.

[75] Trehub, S.E. 2003. The developmental origins of musicality. Nature Neuroscience, 6(7):669- 673.

[76] Trehub, S.E. & Hannon, E.E. 2006. Infant music perception: domain-general or domain-specific mechanisms? Cognition, 100:73-99.

[77] Vratulis, V. & Morton, C. 2011. A case study exploring the use of Garage Band and an electronic bulletin board in pre-service music education. Contemporary Issues in Technology and Teacher Education, 11(4):398-419.

[78] Walker, R. 1996. Open peer commentary: Can we understand the music of another culture? Psychology of Music, 24:103 – 130.

[79] Webster, P.R. & Hickey, M. 2006. Computers and Technology, In: McPherson, G. (ed), The child as musician: a handbook of musical development. New York: Oxford University Press.

[80] White, R.K. 1931. The Versatility of a Genius, Journal of Social Psychology, 33:40-57.

[81] Wing, H.D. 1948. Test of Musical Ability and Appreciation, British Journal of Psychological Supplement. 27:68.

[82] Zatorre, R.J. 2003. Music and the brain. Annals of the New York Academy of Science, 999:4-14.

[83] Zatorre, R.J., Perry, D.W., Becket, C.A., Westbury, C.F. & Evans, A.C. 1998. Functional anatomy of musical processing in listeners with absolute pitch and relative pitch. Proceedings of the National Academy of Sciences of the United States of America, 95:3172-3177.

[84] Zhan, C. 2008. The Correlation between Music and Math: A Neurobiology Perspective. Bryn Mawr College: USA [Internet] <http://serendip.brynmawr.edu/exchange/node/1869> [Accessed 25 May 2015]