EFFECTS OF HAPPY EMOTION DURING LEARNING ON THE PERFORMANCES IN ADDITION AND SUBTRACTION AMONG GRADE 1 FILIPINO PUPILS

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ABSTRACT

The aim of the study was to determine the effects of 'happy' emotions during learning on the performances of addition and subtraction among grade 1 Filipino pupils. Specifically, the study sought to determine if 'happy' emotion induced by background music, colorful materials or a combination of the two could improve the performance of grade 1 Filipino pupils in addition and subtraction. Teaching aids were developed utilizing 'happy' emotion through Filipino children's music as background, colorful materials or a combination of the two. A quasi-experiment was conducted with 4 groups (music group, n=83; color group, n=80; combination of music & color group, n=87 and control group, n=70) from two schools in Manila. The control group was taught the same lessons without the teaching aids. Ten Filipino children's music were selected to be background music. The results showed that nine out of these ten Filipino children's music were effective background music in inducing happy emotions. As for the colors, the results showed that gold, yellow, green, rose, orange, red and blue were better inducers of happy emotions than purple, grey and black & white. Statistically significant differences ($F(3,316) = 15.009$, $p < .001$) were found in the performance of pupils in addition and subtraction, wherein, the pupils in the music group ($m = 1.58$, $sd = 3.85$, $p < .001$), color group ($m = 1.80$, $sd = 3.276$, $p < .001$), and music & color group ($m = 2.25$, $sd = 3.17$, $p < .001$) performed better than the control group. Nevertheless, there was no statistical significant differences among the three interventions of music, color or music & color. The study concluded that 'happy' emotions, whether with the use of music, color or music & color, was able to significantly improve the addition and subtraction performances of grade 1 pupils. This study recommended that 'happy' emotions be utilized in the teaching of grade 1 Mathematics in the Philippines.

KESAN EMOSI GEMBIRA SEMASA PEMBELAJARAN TERHADAP PRESTASI MURID FILIPINO GRED 1 DALAM OPERASI TAMBAH DAN TOLAK

ABSTRAK

Kajian ini bertujuan untuk menentukan sama ada pengajaran berasaskan emosi 'gembira' dengan penggunaan muzik sebagai latar belakang, penggunaan bahan-bahan berwarna-warni, atau combinasi muzik sebagai latar belakang dan bahan berwarna-warni dapat meningkatkan prestasi murid Filipina gred 1 di dalam matematik operasi tambah dan tolak. Alat bantu mengajar telah dibangunkan yang menanamkan perasaan 'gembira' melalui penggunaan muzik kanak-kanak Filipina sebagai latar belakang, penggunaan bahan berwarna-warni, atau combinasi muzik & warna. Kuasi eksperimen dijalankan dengan 4 kumpulan (kumpulan muzik sebagai latar belakang, n = 83; kumpulan warna, n = 80; kumpulan combinasi, n = 87; kumpulan kawalan, n = 70) dari dua sekolah di Manila. Kumpulan kawalan diajar pengajaran yang sama tanpa alat bantu mengajar. Sepuluh muzik kanak-kanak Filipina dipilih sebagai muzik latar belakang. Keputusan menunjukkan bahawa sembilan dari sepuluh muzik kanak-kanak Filipina berkesan untuk mendorong emosi gembira, sementara warna-warna emas, kuning, hijau, *rose*, oren, merah dan biru adalah pendorong yang lebih baik terhadap emosi gembira daripada warna-warna ungu, kelabu dan hitam & putih. Terdapat perbezaan yang signifikan dalam prestasi murid-murid (F (3,316) = 15.009, p < .001) yang menggunakan muzik sebagai later belakang (m = 1.58, sp = 3.85, p < .001), penggunaan bahan-bahan berwarna-warni (m = 1.80, sp = 3.276, p < .001) dan combinasi muzik & warna (m = 2.25, sp = 3.17, p < .001) berbanding dengan kumpulan kawalan. Namun, tidak ada perbezaan yang signifikan secara statistik di antara ketiga-tiga intervensi muzik, warna, dan muzik & warna. Kajian ini menyimpulkan bahawa pengajaran berasaskan emosi 'gembira', samada dengan muzik, warna atau kombinasi muzik & warna, dapat meningkatkan prestasi murid gred 1 dalam operasi tambah dan tolak dan mengesyorkan penggunaan pengajaran berasaskan emosi di kelas-kelas Matematik gred 1 di Filipina.

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DEPED	Department of Education
ES	Emotional Sum
EL	Emotional Learning
MNE	Mean Negative Emotion
MPE	Mean Positive Emotion
NAT	National Achievement Test
NEE	New emotional equilibrium
NSO	National Statistics Office
PEE	Previous Emotional Equilibrium
RA	Republic Act
SPSS	Statistical Package for the Social Sciences

CHAPTER 1

THE PROBLEM AND ITS BACKGROUND

1.1 Introduction

The development of basic numeracy skills which is one of the main goals of early childhood education (ECE) must be given prime importance since it has been shown to help children's learning at the primary school level (Watts et al., 2014) and since the early math knowledge of children strongly predicts later math achievement, even after controlling for differences in other academic skills, attention, and personal and family characteristics (Duncan et al., 2007). The importance of mathematics was further stressed by Biswas (2015) who opined that mathematics makes our life orderly, methodical, systematic and prevents chaos by nurturing the power of reasoning, creativity, abstract or spatial thinking, critical thinking, problem-solving ability and even effective communication skills. Thomson et al, (2005) on the other hand, averred that when young children are given the opportunities to learn, they possess a surprisingly broad, complex, and sophisticated informal knowledge of math suggesting

not only the importance of mathematics but the importance of developing it even in early childhood education.

Capate and Lapinid (2015) found that most of the Grade 8 Filipino students were only in the beginning level of math achievement and half of the tested contents were least-mastered stressing that the mathematics program in the early childhood education failed to develop the needed foundational skills. The common difficulties of these students were incorrectly applying the formulas, properties, theorems, and/or laws and incompletely solving the problem despite correctly doing the initial procedure. The study recommended strategies to improve instruction that included needs assessment, more practice for automation, conduct review classes for mastery and retention, explicit instruction, and peer-assisted mathematics instruction.

To improve math performance, teachers must strengthen early childhood math education and explore the use of emotion in the teaching learning process. Baroody et al., (2001) averred that children who bring foundational knowledge of numbers to first grade are more likely to benefit from mathematical experiences throughout the elementary grades than those who do not have this knowledge. Likewise, the knowledge of number concepts and the skill with mathematics procedures appear to be mutually supportive, each facilitating the development of the other (Rittle-johnson, Siegler, & Alibali, 2001).

Whilst many teachers do not utilize emotions to improve pupil's performance even though Vail (2016) found that emotion is related to learning since the emotional brain, the limbic system opens or closes access to learning, memory and the ability to make novel connections. Moreover, to benefit from emotions teachers ought not to treat emotions as only the product of the processing of information by the brain, but as something that also directly influence the processes of learning and memory in the brain (Tendler & Wagner, 2015).

Teachers can, therefore, improve the performance of their pupils if they learn about the relations between emotions and achievement and utilize it to improve achievements (Valiente et al., 2012). For it was found that when teachers are conscious of students' emotional state, their attitude and feedback become more effective and more timely (Arguedas et al., 2016).

Emotions may be classified as positive or negative. Positive emotions are emotions that are experienced as pleasant while negative emotions are emotions that are experienced as unpleasant. Some studies found that positive emotion can broaden thought-action repertoires (Fredrickson, 2001), suggesting that students and teachers who experience more positive emotions may generate more ideas and strategies. Aside from this, learners who experience positive emotions experience enhanced learning (Park et al., 2015). This is because the incoming information needs to have personal meaning and emotional importance, which are normally associated with positive emotions as a prerequisite to being stored in the long-term memory.

On the other hand, learners who experienced negative emotions experienced learning disability (Woodman, et al., 2009). In other words, students tend to forget those things that lack personal meaning and emotional importance, especially those brought about by negative emotions (Kort et. al, 2001).

Negative emotions lessen the probability that students will use cognitive strategies for deeper, more elaborate processing of information and can reduce working memory, the memory system used for holding and manipulating information while various mental tasks are carried out (Linnenbrink & Pintrich, 2000); and, in reverse, tasks that load working memory capacity can clear the mind of negative feelings (Van Dillen & Koole, 2007). The international consensus about the importance of mathematical competencies in today's knowledge society leads to an increase awareness of children's and adult's emotions through mathematical anxiety- a negative emotion, found to affect math performance. Krinzinger et al., (2009) showed the link between math anxiety and math performance in early primary school years during typical and atypical courses of development. Moreover, Shamoon, (2014) found that mathematical anxiety resulted into different ways of experienced negative feelings towards mathematics which contributed to the low pupils' performance. It has already been demonstrated that people with math anxiety do not necessarily lack ability in mathematics; rather, they cannot perform to their full potential due to the interfering symptoms of their anxiety (Beilock, & Willingham, 2014). These anxieties can manifest in different ways such as physical, psychological, and behavioral symptoms, which can all disrupt a student's mathematical performance (Blazer, 2011).

Since anxiety is a form of negative emotion, it seems that teachers and educators must also consider the role of emotions to bridge the gap in math performance by addressing math anxiety and by using the power of positive emotions because emotions do influence learning (Pekrun & Linnenbrink-Garcia, 2014). To induce happy emotion, the use of music as background and colors for seductive details may prove to be effective. A recent study, which may be relevant to Filipino pupils, found that increasing the amount of classroom music within the curriculum can increase social cohesion within class, greater self-reliance, better social adjustment and more positive attitudes, particularly in low ability, disaffected pupils (Azizinezhad et al., 2012). Another study found that well-designed colorful materials induced positive emotions and facilitated comprehension specially those that utilized warm colors (Plass et al., 2013).

However, studies which associate emotions to academic competence were very few and empirical data were almost non-existent, the few that existed have largely focused on anxiety and the scant theoretical and empirical attentions were devoted to the treatment of other emotions. Farther review of literature on the effects of music, color or emotion in the Philippine setting showed that there is a dearth of literature and studies on this field. But then again, Filipino teachers must capitalize on the fact that learning is an inherently emotional experience (Vail, 2016) where an individual is exposed to many emotions before, during and after the lessons, and examinations in math and in other fields. The role of emotion in learning necessitates further exploration for it could provide alternative ways to improve math performance. There is a need for more studies to confirm the relationships between emotions and math performance and

to actually use music, colors and emotions in teaching math for the benefits they could bring. This is the reason why this study had set out to investigate if happy emotion induced by background music and/or color used as seductive augmenter improves the performance of grade 1 pupils in addition and subtraction in an effort to instigate more studies on the role of emotion in the learning of math skills. This study hoped to ultimately lead to better methodologies, educational practices and performance of pupils in the Philippines and in the world.

1.2 Background Information

The Philippines is an archipelago composed of 7,107 islands with a total land area of 300,000 square kilometers located in Southeast Asia, making public service delivery, including education, challenging. It has an estimated population, as of January 2017, of 103,103,458 people where 35,724,317 are under 15 years old (18,223,536 males and 17,500,781 females) with the median age of 23.5. However, there are 62,976,623 persons between 15 and 64 years old (31,491,920 males and 31,484,703 females) and 4,402,518 persons are above 64 years old (1,900,197 males and 2,502.321 females) (National Statistics Office, 2015).

Sustained economic growth has just begun to translate into poverty reduction; the 2013 Annual Poverty Indicator Survey suggests that real income of the bottom 20% grew faster than for the rest of the population for both wage and entrepreneurial income. Economic growth has also just begun to affect labor markets: Overall unemployment

fell from 7.5% in January 2014 to 6.6% in 2015, underemployment dropped from 19.5% to 17.5%, and youth (ages 18–24) unemployment fell from 17.3% to 15% (Department of Labor and Employment, 2015).

The Philippine education system has been influenced by its colonizers namely Spain, America and Japan. Nevertheless, the education system is patterned to the American system (Department of Education, 2018). Many academics have received training at American University and English is widely used in academic instructions and in business communications. The number of years of formal schooling in the Philippines was used to be one of the shortest in the world which comprises six years of elementary education, four years of secondary education and four years of higher education (UNESCO, 2009).

Recently, a major reform has been implemented to lengthen the formal basic education to 12 years with an added one year of kindergarten. Children now begin their formal education at the age of 5 instead of age 7. The Senior High school level of two years is added to the six years of elementary education and the four years of junior high school. Basic education which is now compulsory comprises of 1 year of Kindergarten at age 5, six years of primary education from ages 6-12, four years of Junior High School from ages 12 to 16, and two years of Senior High School [SHS]) from ages 16 to 18 to provide sufficient time for mastery of concepts and skills, develop lifelong learners, and prepare graduates for tertiary education, middle-level skills development, employment, and entrepreneurship. The academic school year starts in June and ends in March which covers 40 weeks (Department of Education, 2018).

The education system of the Philippines has been tri –focalized. The Department of Education (DepEd) is responsible for the administration and supervision of basic education which is compulsory, (Republic Act 9155, 2001) the Commission on Higher Education (CHED) supervises degree granting institutions (Republic Act 7722, 1994) while the Technical Education and Skills Development Authority (TESDA) supervises Vocational and Technical Education (Republic Act 7796, 1994).

Elementary education which falls under the purview of the Department of Education lasts for six years is free and compulsory. A year of compulsory kindergarten at age five has been introduced under the K-12 reform Every Filipino child now shall have access to early childhood education through Universal Kindergarten. Filipino Children are now given the means to slowly adjust to formal education, are taught the foundation for lifelong learning for the total development of a child and learns the alphabet, numbers, shapes, and colors through games, songs, and dances, in their Mother Tongue. These reforms were introduced by the Kindergarten Act of 2012 and the Enhanced Basic Education Act of 2013 which extended the formal education from 10 to 13 years (Republic Act 10533, 2013).

The elementary curriculum covers language arts (Filipino, English and the Mother tongue. Twelve (12) MT languages have been introduced for SY 2012-2013: BahasaSug, Bikol, Cebuano, Chabacano, Hiligaynon, Iloko, Kapampangan, Maguindanaoan, Meranao, Pangasinense, Tagalog, and Waray. Other local languages will be added in succeeding school years.); mathematics; science (grades 3-6); Social

Studies; civics; music, art & PE; health; technology (grades 4-6); and History/ Geography (grades 4-6) (Department of Education, 2018).

This reform in the education system is beset with some pressing problems that need to be addressed for the K-12 program to achieve its intended impact. One nagging problem that stresses available resources is that the system is large, with more than 21 million students in grades 1–10, nearly 60,000 elementary and secondary schools, and more than 735,000 teachers, which prevents large scale innovations to reach all schools simultaneously and requires huge amount of resources for education which the Philippines can barely meet. Another is the lag in the secondary education. About 30% do not continue their secondary education. Although the access rate for elementary school rose from 90.7% in 2002 to 95.4% in 2010 and the access rate for secondary school also improved from 59.7% to 64.5%, many still was unable to continue their secondary education. In 2011, for every 100 children who started grade 1, only 54 completed high school. While the cohort survival rate at primary schools increased from 71.8% in 2003 to 73.5% in 2011, the secondary level cohort survival rate stood at 78.8%—about 1 percentage point above the 2003 level. The school dropout rate in 2011 for children aged 6–11 from the poorest quintile was more than seven times higher than that of children in the same age group from the richest quintile, and the dropout rate for children aged 12–15 from the poorest quintile was more than 13 times higher than that of children in the same age group from the richest quintile. Yet another problem is the low achievement rate of students in the National Achievement Test. The overall mean percentage scores on the NAT have been low across years. Subject-specific scores on the 2008 NAT indicated that the weakest mastery was in mathematics (42.9%) and

science (46.7%) and surveys of firms and investors showed that low performance by the country's students and graduates in mathematics, science, and English may constrain economic modernization. Lastly, the teaching approach in the Philippines has been largely rote-based, which leaves learners with a limited mastery of and ability to apply knowledge and skills in further education and the workplace (Sarvi, Munger & Pillay, (2015).

The K to 12 program also introduced changes in the Mathematics program in the basic education levels of the Philippines which is now focused on the twin goals of Critical Thinking and Problem Solving which are to be achieved with an organized and rigorous curriculum content, a well-defined set of high-level skills and processes, desirable values and attitudes, and appropriate tools, taking into account the different contexts of Filipino learners. In grade 1, Mathematics is taught at Philippine schools for 50 minutes daily. The minimum performance standard for grade 1 is to apply addition and subtraction of whole numbers up to 100 including money in mathematical problems and real- life situations (Department of Education, 2010).

However, even though applying whole numbers up to 100 is the minimum performance standard, mathematics teachers are not precluded from exceeding this standard and from challenging their pupil's ability especially if the pupils showed potentials in learning advance knowledge in Mathematics. Sullivan et al. (2006) posited that by providing appropriate challenge, effective teachers signal their high but realistic expectations. This means building on students' existing thinking and, more often than not, modifying tasks to provide alternative pathways to understanding.

Furthermore, it is important to challenge early childhood pupils since there is a need for teachers to engage children in an empowering process where their diverse skills and abilities are recognized so that educators are able to explore alternative pedagogical strategies that support children's learning. (Ang, 2014) Aside from this, children need the opportunities to develop and utilize their learning capacities in activities that engage and stimulate high levels of concentration, interest and enjoyment, (Shernoff, Abdi, & Anderson, 2014) because when children are asked probing questions that challenge their thinking and when they receive supportive feedback, they improve their performance (Weisberg et al., 2013).

The sad reality is that in the Philippines, the mathematics teacher was the only predictor of Mathematics performance which proved the long-time belief that pupils' success in learning greatly depends on the teacher (Valdez and Guiab, 2015). Moreover, the 2008 National Achievement Test results showed that the weakest mastery of Filipino students was in mathematics (42.9%) while the study of Capate and Lapinid, (2015) indicated a gap in the mathematics program that required efficient solutions which do not only center on the teacher and the mastery of contents but on the over- all learning experience of the pupils especially in early childhood education. Thus, there is the need for school heads to encourage teachers to upgrade themselves professionally both in content and pedagogy. Another particular avenue that has not been fully investigated and utilized which may prove to be useful is the inclusion of emotions in the teaching-learning process in Mathematics.

1.3 Need for the Study

Research bridges the gap between what is and what ought to be. It is often conducted to offer solution to a perceived problem or to support and find evidence for or against a particular belief or proposition, or to try new ways of doing things to achieve better results or performance levels especially in education.

The need for this study arose from the gaps between the desired performance in basic mathematical skills of elementary Filipino pupils and their actual performance which recorded below average performances three years in a row despite the introduction of the new K-12 program that overhauled the whole curriculum to supposedly make Filipino performance competitive and at par with its Asian neighbors.

According to Hachey (2013), young children engage in diverse types of mathematical thinking in their day to day experience with the physical and social world. Children's learning in the first six years of life demonstrates the importance of early experiences in mathematics. By engaging and encouraging early experience with mathematics, children develop confidence and their ability to understand and use mathematics. By creating a positive climate in mathematics education, teachers help children develop dispositions such as curiosity, imagination, flexibility, inventiveness, and persistence, which contribute to their future success in and out of school (Clements & Conference Working Group, 2004).

Additionally, a high-quality childcare can improve many different outcomes: the benefits of quality early education and childcare range from ensuring children's healthy cognitive, behavioral, social and physical development and laying the foundation for later outcomes. (Sylva et al., 2014; Melhuish et al., 2015) Besides, the impact of teaching mathematics in early childhood education cannot be disregarded since early childhood curricula provide an orientation within which the educator can create experiences that enable the child to use and develop mathematical skills and knowledge (Gasteiger, 2014). Thus, children need to be taught knowledge of mathematics in their earliest years given the importance of mathematics to academic success in all subjects (Sadler and Tai, 2007). In addition to this, Wood and Attfield (2005) posited that the early years were particularly important for developing children's ability and enthusiasm in mathematics. They believe that the more practical activities children experienced the more success they would have in becoming what they call "real-world mathematicians". Lastly, by providing early childhood education with an environment that is mathematically rich, teachers lay the foundation for their students' future success at learning. (Baroody, 2001)

It appeared that the key to improving mathematics performance lies on a strong early childhood education. However, a review of studies and literature in the Philippines showed that in spite of the many attempts of Filipino teachers to improve early childhood math through the use new methodologies and strategies in teaching basic math, the actual performance of Filipino pupils remained wanting. Studies about early childhood mathematics, methods and strategies were few and the use of emotion in improving mathematics performance is virtually non-existent.

This got the attention of the researcher who became curious as to why performance of Filipino pupils were very low and felt that there is a need for a study to help teachers teach more effectively and efficiently in mathematics. So, even though the researcher was educated in the rationalist tradition with a degree in philosophy, he set out to investigate the non-rational part of learning because he suspected that there was something amiss when the teaching and learning process were relegated only to the realm of the intellect and simply ignores emotion or considers it as hindrance to learning. The researcher became curious as to why brilliant people sometimes fail and not so brilliant people sometimes succeed in learning and in life. He supposed that perhaps there are other ways to learn aside from the mental development strategies. A strong desire to understand the learning process and to discover new ways of teaching led him to turn to emotions. He was further motivated to investigate the role of emotion in learning when he initially observed that students who were happy or with positive emotions generally performed well in his class than those who were anxious or with negative emotions. And since children has not yet reached a mature state of rationality, the researcher turned to emotion as a possible source of solving this gap in the performance of children especially in mathematics. So, the need to conduct this study became evident to find if there exists statistical basis for the claim that emotions especially happy emotion improves the performance in math and if this is so, to identify some effective ways for the teachers to induce happy emotion from their pupils so that the pupils' level of performance will improve. There is, therefore, a need to conduct this study not only to satisfy the curiosity of the researcher but to address the need of the teachers for a more responsive and better teaching process and to offer the pupils a better way of learning which translate to better performance in math.

1.4 Research Problem

The Department of Education of the Philippines stresses the importance of the Mathematics program by utilizing many modern and tested theories and pedagogy. However, the mathematical achievements of Filipino students were very low as shown by the achievement rate of grade VI students in Mathematics at the National Achievement Test (NAT) from 2008 to 2012 that ranges from 63.26% to 68.43% and which saw a decline in the year 2013 to 66 .32 % and an improvement in the year 2014 to 68.82%. But even if it appears to be improving, it still did not reach the 75% standard passing level (Department of Education, 2015).

These poor achievements of pupils in Mathematics were found by Suan (2014) to be due to student factors such as study habits, time management, and attitude towards mathematics while Andaya, (2014) attributed them to four factors namely; the individual (student), instructional (teacher), classroom management and evaluation. The modern theories and pedagogies introduced in the K-12 program may not be enough. The mounting evidences found in the studies in other countries on the beneficial effects of emotion in learning may hold the key to the effective and efficient learning of mathematical skills and to better performance of Filipino pupils. The use of induced happy emotions through colors and/or music may prove to be more suited in the Philippine setting since Filipinos are generally perceived to be music lovers,

cheerful and emotional rather than rational in their dispositions (Gallup Inc., 2016; Jocano, 2000).

Pekrun et al., (2014) established that emotions do influence learning even though, there are inconsistent findings on the direction of effects (Um, Plass, Hayward, & Homer, 2012) that led to the two contrasting viewpoints on the influence of emotion to learning. First, emotion as facilitator of learning which posits that emotion lead to better learning outcomes and second, emotion as suppressor of learning which posits that emotion impair learning.

Um et al. (2012) further demonstrated that learners who were induced with positive mood outperformed learners who were induced with neutral mood in comprehension and transfer tests. They also showed that positive emotion can be transferred to learners through interface designs, such as anthropomorphism and bright colors. These findings were similar to the findings of Plass et al. (2014) that tested the effects of color and anthropomorphism on learners' emotion, motivational and cognitive outcomes.

In addition, Park et al. (2015) revealed that learners who were induced with positive mood had higher learning outcomes in comprehension and transfer tests and showed longer fixation durations on the relevant information of the multimedia learning environment than learners who were induced with neutral mood or negative mood. Thus, as Wolfe (2006) has observed, there is an untapped benefit for educators to utilize the power of emotion in inducing learning and in improving performance.

To benefit from the power of emotion in teaching math, seductive augmentation may be used to improve the performance of Filipino pupils. Seductive augmentation according to Schraw & Lehman, (2001) is the employment of interesting colors, visuals, illustrations that contain highly interesting, but unimportant information, to promote or help understanding the topic. It is used as a strategy to engage a learner's attention and promote interest because it was found that visually appealing elements enhances the cognitive processes and leads to better learning scores (Mayer & Estrella, 2014; Plass, Homer, & Hayward, 2009).

Aside from colors and visually appealing elements, Dodge & Heroman, (1999) explored the notion that math gains occur as a direct result of music education in the early grades which placed the greatest emphasis on spatial reasoning. Listening to and making music form strong connections in the brain and these are the same connections that are used to solve math problems.

The study of Rauscher et al. (1993) claimed that after listening to Mozart's sonata, normal subjects showed significant improvement on spatial reasoning skills. But some studies were not able to reproduce the findings even though other studies confirmed that listening to Mozart's sonata K448 produced a small increase in spatial-temporal performance. This became controversial and became famous and was dubbed as the Mozart effect. The Mozart effect was demonstrated by Rauscher et al (1993) when they showed that ten 3-year-olds scored significantly better on a spatial reasoning test after music lessons. This finding was supported further by Hetland (2002b) who

expressed strong confirmation of the idea that there is a direct causal relationship between active music learning and spatial-temporal reasoning. On the other hand, the study of Deasy, (2002) suggested that the pre-wired connections to spatial thinking in the brain are triggered by active engagement with traditional music instruction, regardless of the intent of the music teacher.

Some brain development research found that the early years are a prime time to make strong connections along the associated neural pathways, with music exposure as a perfect entryway (Strickland, 2002; Halfon, 2001; Pantev et al, 1998). These neural pathways are the same pathways that are used in completing complex spatial reasoning tasks. The more these pathways are forged and used, the stronger the connections become. These strong connections lead to easier access and translate into better skills that can extend the attendant spatial reasoning gains over months or even years (Rauscher et al, 1997; Gardiner, 2000; Hetland, 2000b). In addition, studies that focused on music for young children also suggested that math gains increase according to the number of years that students engage in active music learning, (Gardiner, 2000) with some indication that the younger the children when they begin music instruction, the greater the gains.

Colors shall be used in this study to induce happy emotion since Plass, Heidig, Hayward, Homer, and Um (2014) and Um et al. (2012) have already established that emotional design with round shapes, warm colors and anthropomorphisms in the multimedia instruction was able to induce positive emotions and foster learning and that emotionally appealing design enhanced learning (Mayer and Estrella, 2014). These

cited studies guided the current research in its attempt to investigate the effect of Filipino Children's music used as background and/or colors in inducing happy emotion on the performance in addition and subtraction of grade 1 Filipino pupils. However, the above cited studies were not done in the Philippine setting which may not yield the same results and implications due to the difference in cultural and educational perspectives. Aside from these, upon review of some University on-line Libraries in the Philippines, it was established that there is a dearth of literature and studies about the effects of emotion in the teaching- learning process of Filipino pupils. The need to improve the mathematical achievements of Filipino pupils is immediate. The utilization of the power of emotions in the teaching-learning process may provide a new solution to this recurring problem.

This study, therefore, attempted to improve the performance in addition and subtraction of grade 1 Filipino pupils by developing and utilizing emotion-based teaching aids through the use of Filipino children's music as background and the use of colors that induce happy emotion. Furthermore, this study sought to establish the ability of happy emotion to significantly improve the performance in addition and subtraction of grade 1 pupils.

1.5 Objectives

The overarching objective of this research was to develop emotion-based teaching aids aimed to improve the performance in addition and subtraction of grade 1 pupils through happy emotion induced by music as background and color as seductive augmenter. From the overarching objective, this study set out to pursue the following three specific objectives:

1. To develop emotion-based teaching aids by identifying and utilizing Filipino children's music played as background, colors for seductive augmenter, and a combination of music and colors to induce happy emotions which improve performance in addition and subtraction of grade 1 Filipino pupils.

2. To determine if the pupils who were taught using the emotion-based teaching aids that induced happy emotion through the traditional Filipino children's music played in the background, through the use of Colors as seductive augmenters or through the use both music and colors, performed better than those belonging to the control group;

3. To determine the views and evaluation of the teachers regarding the usefulness of the emotion-based teaching aids.

1.6 Research Questions

To achieve the overarching objectives and its three specific objectives, answers to the following questions were sought:

Research Question 1: What were the stages of development in developing the emotion-based teaching aids?

Research Question 2: Was there any statistically significant difference between the performance in addition and subtraction of the control group and the experimental groups?

Research Question 3: Were the performances of the individual experimental groups better than the control group? This research question was answered by breaking it into three sub-questions as below:

3.1 Was the performance in Addition and Subtraction of the Music group better than the control group?

3.2 Was the performance in Addition and Subtraction of the Color group better than the control group?

3.3 Was the performance in Addition and Subtraction of the Music & Color group better than the Control group?

Research Question 4: Was there any significant difference in the performance in addition and subtraction of the music, color and music & color groups?

Research Question 5: How did the participating teachers view the emotion-based teaching aids in terms of: a. usefulness and b. observed effects on the pupils?

1.7 Hypothesis

This study will test the following null hypotheses:

Research Question 2: Is there any statistically significant difference between the performance in addition and subtraction of the control group and the experimental groups?

Ho.1: There is no statistically significant difference in the performance of the experimental groups and the control group?

Research Question 3: Were the performances of the individual experimental groups better than the control group? This research question was answered by breaking it into three sub-questions as below:

3.1 Was the performance in Addition and Subtraction of the Music group better than the control group?

Ho.2: There is no statistically significant difference between the performance in Addition and Subtraction of the Music group and the control group?

3.2 Was the performance in Addition and Subtraction of the Color group better than the control group?

Ho.3: There is no statistically significant difference between the performance in Addition and Subtraction of the Color group and the control group?

3.3 Was the performance in Addition and Subtraction of the Music & Color group better than the Control group?

Ho.4: There is no statically significant difference between the performance in Addition and Subtraction of the Music & Color group and the Control group

Research Question 4: Was there any significant difference in the performance in addition and subtraction of the music, color and music & color groups?

Ho.5: There is no statistically significant difference among the performance of the music, color and music & color groups?

1.8 Theoretical Framework

This study adopts for its framework the Dynamic Systems Approach (Thelen, 2005) and the Cognitive Emotional Pedagogy (Mäkivirta, 2002). The dynamic systems approach centers on two recurring themes: First, development is a multifaceted, multiple, mutual, and continuous interaction of all the levels of the developing system, from the molecular to the cultural. And second, development is an unfolding process which may emerge over many timescales from milliseconds to years.

The core concept of dynamic systems theory is that development is a dynamic process that occurs within a system, wherein flexible and stable behavior emerges which is determined by multiple factors and softly assembled (Thelen, 2005).

Human beings are complex dynamic systems who are affected by emotions, who organize their actions and behaviors to achieve specific goals and tasks even in the absence of direct input from higher order structures or predetermined rules (Lewis, 2000b; Kelso, 1995). People are influenced by environmental factors and task constraint which may limit and guide their behavior and shape the affordance that are perceived to complete goal-directed actions (Newell, 1986). A stable pattern of behavior emerges by detecting informational variables and subsequent perception of possible affordance. Any little change in the flow of information, environment or change in the constraints can disturb the stable state of behavior and trigger a change towards a new state of stability, requiring the system to adopt different states of organization (Kelso, 2012; Kelso & Tognoli, 2009).

Human beings learn or develop by adopting new and functional pattern of behavior. Stable patterns of behavior are specific responses to specific information flow between the individual and his environment (Thelen, 2005).

There is learning when a dynamic system (the pupil) becomes unstable caused by changes in the environment and the pupil searches for functional solution to the new constraints brought about by changes in the environment (Chow, et al., 2007) which is characterized by markers or predictors for phase transitions that include variability in

movement as the learner tries to make his behavior stable (Chow, Davids, Hristovski, Araujo & Passos 2011; de Weerth & van Gert 2000).

The Dynamic Systems Theory provides the theoretical principles for conceptualizing, operationalizing, and formalizing the complex interrelations of music, colorful learning materials and emotions in the process of learning basic mathematical skills. The happy emotion induced in this study is expected to create a new environment that shall cause instability so that the pupils will search for functional solution in an effort to stabilize the system. However, this theory sees learning as an effect of the changing environment and does not account for the conscious effort of the individual to create his own meaning from his experience. Another theory which may account for active learning and may support the Dynamic System Theory is the Cognitive Emotional Pedagogy (CEP) which is a method of teaching and learning based on cognitive psychology and the constructivist learning theory which claims that an individual learner can create meaning from his experience. Construction and retention of new concepts and skills is most effective if the learning content is associated with creativity and emotionally distinct experiences. This theoretical framework was adopted from the framework created by Joni Mäkivirta (2002).

Learning is defined in this framework as a relatively permanent change in behavior. Learning happens when an individual constructs concepts that lead to changes in the existing conceptual map (existing knowledge). Conceptual construction can take form of extension, rearrangement or paradigmatic structuring. The conceptual extension happens when new concepts are so closely linked to the existing knowledge

that the overall conceptual structure and logical connections can be retained. Conceptual extension is associated with linear logical processes. Conceptual rearrangement happens when new concepts are sufficiently dissimilar in terms of ‘shape’ and ‘behavior’ to the existing concepts that their assimilation requires existing knowledge to be rearranged. Conceptual rearrangement is associated with lateral logical processes. Paradigmatic structuring happens when new concepts are so dissimilar in terms of ‘shape’ and ‘behavior’ to the existing knowledge that their assimilation to existing knowledge fails. The acquisition of new concepts is possible only if the conceptual map is rebuilt. Paradigmatic structuring is associated with creative theorizing that challenges existing assumptions.

Mäkivirta (2002) claims that creativity is deprived in traditional education because it focuses on conceptual extension and rearrangement, but not on paradigmatic structuring, even though the latter has been responsible for paradigm shifts that have created the greatest progress in human knowledge. According to the theory all three types of learning happen at all ages, but the greatest amount of paradigmatic structuring takes place in the early childhood. Traditional schooling is criticized for destroying the ability to learn paradigmatically by conditioning students to believe that the teacher is the only source of reliable knowledge and using assessment as a 'cognitive control tool'. This practice is particularly detrimental if assessment tasks are inappropriate for the students' level of cognitive maturity.

The overemphasis on facts and of mathematical and linguistic operations at the expense of emotional engagement and concept discovery lead to deprived and biased

thinking and prevent development of fully functioning intellect. Mäkivirta (2002) suggests that more effective and transformative learning can be achieved if the learning content is delivered using Cognitive Emotional Pedagogy that combines creative emotional experiences with learning tasks. To create a learning environment that supports Cognitive emotional pedagogy, schools should align their pedagogical practices and learning cultures with the principles of Cognitive emotional pedagogy.

In summary the following are the principles of cognitive emotional pedagogy:

- Teachers are concept assimilation and creativity facilitators
- Learners are knowledge creators
- Pedagogy should support knowledge creation by fostering conceptual manipulation skills, providing relevant emotional experiences and promoting sharing of created knowledge
- Curriculum should be based on assimilation of concepts and logical operations typical of various ‘areas of knowledge’ and provide learner-specific educational plans
- Assessment should be based on expressed guidelines and should credit concept creation, creativity, emotional expression and conceptual manipulation skills
- Self-evaluation should be used to create meta-cognition regarding aspects of learning process
- Learning culture should be defined by positivity, openness and tolerance for ambiguity

1.9 Conceptual Framework

The emotion based learning framework was conceptualized by combining the principles of cognitive emotional pedagogy and the two themes of ecological dynamic, which stated that development is a multifaceted, multiple, mutual, and continuous interaction of all the levels of the developing system, from the molecular to the cultural and that development is an unfolding process over many timescales from milliseconds up to years. The paradigm shown in figure 1.1 below illustrates this.

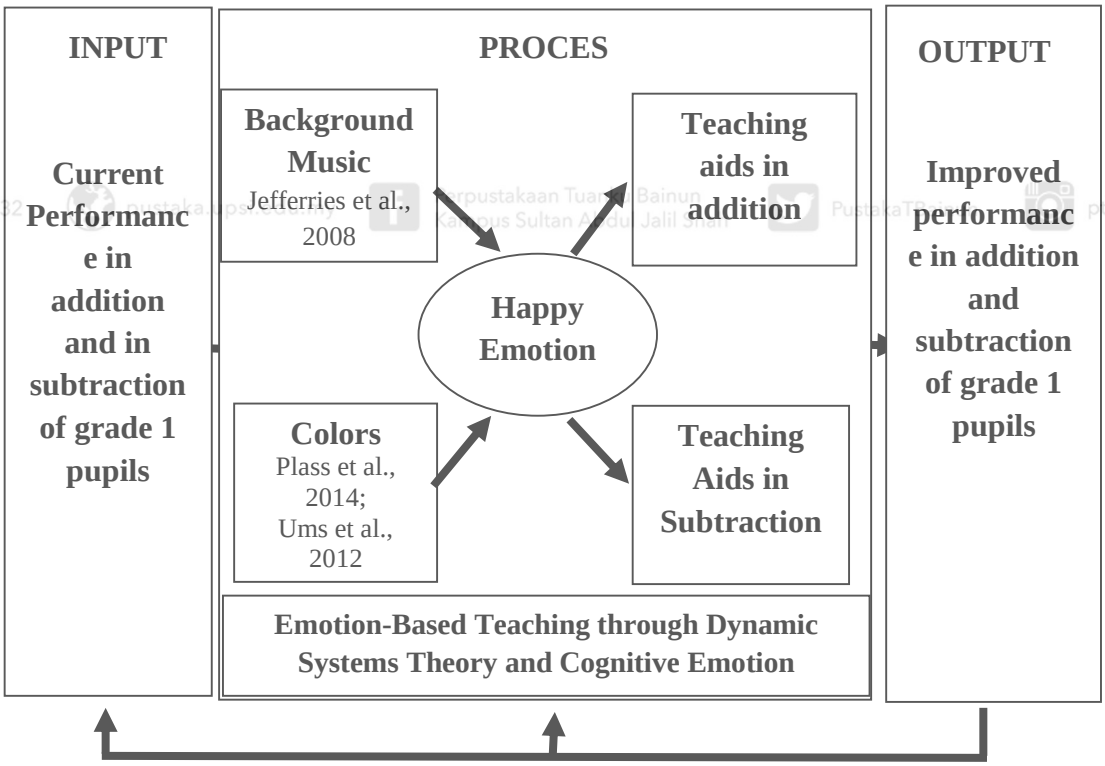

Figure 1.1. Conceptual Framework: Emotion Based Teaching Aids through Music and/or Colors

The emotion-based teaching aids developed in this study utilize the distinctive character of Filipinos which generally are emotional by nature (Jocano, 2000) and were

in accord with the Cognitive emotional pedagogy (Mäkivirta, 2002) and the Dynamic system theory (Thelen, 2005) which recognized that humans are emotional beings and learning involves emotions. The conceptual framework (see Figure 1.1 above) posits that emotions are not lost but are merely transformed to other emotions in a spiral progression or regression. In other words, it is a dynamic process. It views learning as the transformation of antecedent emotions into a new state of emotional equilibrium through the summation of concomitant emotions which employs concept construction. It further contends that learning is a process of emotionalizing sense data into a viewpoint, which leads to the development of belief, values and conviction. It posits that humans can only grasp the sensed characteristics of things and may achieve conviction about the material world that they experience. A human being is a material being and his knowing faculty is the brain (McGeehan, 2001). However, recent studies found that emotions do influence learning (Pekrun & Linnenbrink-Garcia, 2014).

Pupils are dynamic systems (Thelen, 2005) that are determined by multiple factors and softly assembled over time. Human knowledge is the sum or the totality of meanings that one gives to realities that one experienced and emotionally summed.

The learning process according to the emotion-based learning framework begins when a person feels or senses a particular reality. This is the antecedent emotion. The data coming from the senses is transmitted to the brain through the neurotransmitters in the form of electrical/chemical impulses. The sensing process is an emotional act and through this antecedent emotion, an emotional stirring is created in the brain and in turn destabilizes the system and generates interest that prompts the

senses to gather more data until the brain is able to create a viewpoint in the common senses or the concomitant emotion. A viewpoint is an emotional image of the reality sensed. This image is the product of specific combinations of electrical impulses, chemicals or energy created by the brain, which in turn stirs the present emotional order to form new belief, value, or conviction about reality either through extension, rearrangement or paradigmatic structuring. The result is the consequent emotion or what we know as knowledge which is stored in the emotional memory in the form of emotional equilibrium or disposition and is transmitted by the brain to the specific body parts for action or fruition. This fruition is what we termed as feeling of satisfaction or dissatisfaction that may motivate or hinder us from further learning.

Learning, therefore, may be viewed as the totality of emotions created consciously or subconsciously by the person through the things sensed (antecedent emotions) and created by a deliberate act of the individual (consequent emotions) that leads to concomitant emotions. Emotions are not only the product of the processing of information by the brain, but they directly influence the processes of learning and memory in the brain (Tendler and Wagner, 2015). Learning is thus an emotional act and the extent of learning may be determined by adding up the antecedent, concomitant and consequent emotions. If the sum is greater than the previous emotional equilibrium, there is positive learning and if the sum is lesser than the previous emotional equilibrium, there is negative learning.

The process of learning is spiral that progresses or regresses and its outputs are in the forms of belief, values, and convictions or the consequent emotions that result

into action or fruition. Consequently, learners and facilitators of learning must be conscious of the interplay of different emotions and the emotional environment that they create in the course of the teaching learning process. Thus, the need for psychologists and teachers to devise some intervention plan specifically related to difficulties in emotion regulation in order to assist students to improve their learning and performance (Singh & Singh, 2013).

This emotion-based learning framework determines the extent of emotional learning by using the formula, NEE= PEE + ES. Where NEE refers to the new emotional equilibrium while PEE is the previous emotional equilibrium that is computed by adding the mean of the initial emotion and the mean of the pre test. Emotional sum or ES is computed by adding the mean of the induced emotion and the mean of the post test.

To find out the effect of emotion-based learning aids, the NEE of the non-emotion-based learning method is compared to the NEE of the emotion-based learning method. A higher NEE for the emotion-based learning method would indicate improved learning and better performance by pupils and the effectiveness of the learning aids. But in order to achieve higher NEE the principles of the emotion-based learning must be practiced in the classroom which involves the multiple causal factors within the pupils and their environment by which emotions affect the pupils' behavior, in this case happy emotion to account for higher emotional sum or ES. The happy emotion or other positive emotions that are induced using music as background and/or colorful aids or other means that utilizes emotion in learning are used to stir the previous emotional

equilibrium of a dynamic system, like a pupil, who becomes unstable due to internal or external elements disrupting his coherence. The pupil then reorganizes the system's components into a new, more stable state. The old behaviors (PEE) become less stable and less preferred by the system or the pupil (Thelen, 2005; Thelen & Bates, 2003) and the pupil undergoes paradigmatic structuring, rearrangement or extension in concept creation.

The effectiveness of music as background in inducing the required emotional states was established by the study of Bogert, et al. (2016). On the other hand, Plas, J., et al, (2013) established that round face-like shapes both alone and in conjunction with warm color induced positive emotions. Comprehension was facilitated by warm colors and round face-like shapes, independently as well as together. In Emotion Based Learning framework, colors as well as music are utilized in presenting learning aids as new components in the teaching of Math skills to induce happy emotions (Mean positive emotion or MPE) that will improve the addition and subtraction performance of grade 1 students.

Furthermore, since change is not a stage-like progression of new accomplishments but the waxing and waning of patterns (Thelen & Bates, 2003), the framework views development in a non-linear way and posits that mathematical skills are developed over-time and treat pupils as active problem solvers sensitive to the changes in their emotions, environment, tasks and as responsible change agents. Moreover; since, any dynamic system is an integrated system that cannot be partitioned (Spencer et al., 2006) any change in the pupils' emotion, cognition or environment

(positive or negative emotions) shall be investigated to find out its impact on the other aspects of the system. Lastly, since development is the emergence of behavior brought about by multiple factors, this study shall not employ any rigid rules for the development of mathematical skills and shall treat the pupils as unique individuals, who have their own way of learning the basic mathematical operations skill and who may employ different pathways to development which is nearly impossible to predict (Thelen, 2005).

Lastly, the Emotion based learning aids were developed with the principles of cognitive emotional pedagogy in mind. The learning aids were used to effect paradigmatic structuring to rebuild the conceptual maps of the subjects on the two basic mathematical operations skills. The happy emotion shall be induced to evoke better performance and to avoid overemphasis on memorization and mathematical rote learning at the expense of emotional engagement and concept discovery. Of the seven principles of Cognitive Emotional Pedagogy (Mäkivirta, 2002) the emotion-based learning framework adopted the principle that teachers are concept assimilation and creativity facilitators. Teachers were viewed in this study guides and not the sole source of knowledge and the center of the educative process. Furthermore, this role of the teacher jibes with the second principle of Cognitive Emotional Pedagogy that views learners as knowledge creators. Students did not just receive ready information from the teacher and were not only a product of his environment but were active participant in the search for learning and the creation of meaning from his own experience. The third principle propounded by Mäkivirta, (2002) was used to emphasize emotion-based learning by fostering conceptual manipulation, by providing relevant emotional

experience and promoting sharing of created knowledge in the developed learning aids. Assessments were based on expressed guidelines and the framework credits concept creation, creativity, emotional expression and conceptual manipulation skills while evaluation were used to create meta-cognition regarding aspects of learning process and defining learning by positivity, openness and tolerance for ambiguity.

1.10 Significance of the Study

This research examined the effects of emotion-based learning aids on the addition and subtraction performance of grade 1 Filipino pupils in the quest to contribute and discover better methods and strategies in teaching basic mathematical competencies to Filipino pupils which may lead to improved performance in mathematics.

There were several implications that could be drawn from the present research to make the teaching of mathematics efficient and effective not only for the various stakeholders in the educational environment in the Philippines but also for any education stakeholders who are interested to improve young children's learning in mathematics. The following stakeholders may benefit from this study:

a) Curriculum Designers.

The compelling question among educators today is how to enhance teaching and students' learning in order to increase academic achievement and enhance life skills

of the learners. Many solutions are being offered to respond to this question in schools throughout the nation. The present research will enable the curriculum designers to design a more comprehensive curriculum which does not demonized but incorporates emotions in the learning process to make it enjoyable, effective, efficient and relevant. By providing curriculum designer the seminal knowledge in the use of specific music and colors that induce happy emotion to improve performance in basic mathematical skills, this study may prove to be useful in crafting a better curriculum in teaching the basics in mathematics.

b) Policy Makers.

By providing proof of improve performance through emotion-based learning this study may provide policy makers enough grounds to craft educational policies that are not only based on rationality but on sound emotions that makes humans truly humane and learning more holistic and meaningful.

c) School Administrators and Principals

The school administrators and principals may benefit from this study for they shall be provided with a new perspective on the importance of establishing the proper emotional school environment to raise the performance of their pupils and encourage them to better guide their teacher in teaching with passion and compassion which may prove to be better than rote learning.

d) Teachers

Teachers may benefit from this study for they may be provided with alternative teaching methodology that puts premium on the power of emotion in the learning process and inspire them to develop new strategies to utilize in specific ways other positive emotions and to neutralize the negative effects of other emotions in their quest to improve the basic skills and performance of their pupils.

e) Young Children

This research study will be significant not only to Filipino Pupils but to young children of any nationality for they shall be provided with improved learning atmosphere and delivery system of teaching that incorporates positive emotions in the learning process and thus making the learning process enjoyable, productive and of better quality.

f) Parents

Parent shall benefit from this study by being assured that their children's education is founded on sound emotional practices that does not deny their children's emotion but instead utilizes them to bring about better performance of their children not only in mathematics but in life in which emotions plays a vital role in the success of every individual.

g) Community

The Community may find this research beneficial because it shall provide the seed and the initial evidence in the effective utilization of emotion in the learning process which may lead towards efficient educational programs that develops graduates who are high achievers, citizens who are emotionally stable and members who are civil and humane in their dealing with others because of their happy experience in the school during their formative years.

1.11 Limitation of the Study

This study is a quantitative research that made use of the survey method to gather the antecedent and the consequent emotions of the pupils when they were subjected to certain music and/or color to find out if the music and/or color induce happy emotion. From these, the Emotion based learning modules was developed, validated and tested. The quasi-experimental method specifically that of the pre test- post test design was also utilized to measure the effects of the emotion-based learning modules on the performance of grade 1 Filipino pupils in addition and subtraction.

This study assumed that the pupils are equal in terms of their mental abilities and that they did not have special needs that drastically affected hearing and seeing. The instruments were assumed to be valid and reliable measure of pupils' skills after construct and content validity analysis. There was no distinction as to age, economic

background or whether they come from rural or urban schools and public or private schools because they are of the same age (6-7 years old) and economic background (middle class). All of them also came from urban public schools. The only factor that was considered was their sex because music and color stereotypes as to sex may have already affected them in their young age.

Another limitation of this study was the short duration of study because the researcher was only permitted by the Department of Education to conduct the actual experiment for two weeks so as not to unnecessarily disturb the classes**.** Aside from this the teacher factor may have an impact on the result and the novelty of this study and the Hawthorne effect may affect the performance of the pupils because of the new materials and teaching methods used in teaching the experimental group and because they know that they are being studied might alter their performance to please the teacher.

Lastly, since this study involves young children, one important limitation is the tendency to describe the effect of colors holistically or categorically even though this study only used generic colors because the children may not yet know the other properties of colors. The effects of colors are actually due to the contrasts of three relative attributes that define all colors: first the value, (light vs. dark, or white vs. black) second, the Chroma, (saturation, purity, strength, intensity) and third the Hue (the name of the color family: red, yellow, green, cyan, blue and magenta). And then there is also the limitation on the different properties of music which this study did not distinguish. The results of this study may have been different if these factors were considered in the

conduct of the intervention. Thus, the generalization of the findings shall only apply to similar population, using the same instruments.

1.12Operational Definition of Terms

a) Background Music.

Background music refers to music that plays in the background while studying, reading a text, listening to the lesson or doing an activity. Learners are asked to listen to this music but there is no relation between the music itself and the main task, namely learning addition and subtraction.

b) Emotion.

Emotion is a kind of feeling which refers to affections, appetites, sensations and tactile perceptions. This study shall use *Emotion* as a type of affection distinct from agitation and mood. Emotions being a kind of affections do not have a bodily location unlike sensation and do not inform one about the state of one's body, even though they are sometimes linked with sensations. (Hacker, 2004)

c) Emotion Based Teaching.

A new methodology specifically developed using music and colors to induced positive emotion, like happy, so that this emotion may induce emotional learning and improve

the learning of mathematic skills and performance of pupils. To determine the amount of emotional learning, all emotions felt during the learning process are summed up. Negative emotions are subtracted to positive emotions. The result is called the emotional sum. And from this result are added or subtracted the previous emotional equilibrium. The formula for emotional learning is: **NEE=ES+-PEE,** where NEE refers to emotional learning, ES to emotional sum, PEE to previous emotional equilibrium. The mean positive emotion (MPE) and the mean negative emotion (MNE) are added to find the emotional sum.

d) Happy Emotion.

The term refers to the emotion of enjoying or characterized by well-being, contentment, feeling of enjoyment and having a sense of confidence in and satisfaction with a person, place or thing. In this study, this refers to the good feelings induced through music and/ or color. In this study, happy emotion refers to the feeling of the pupil as expressed in a simple questionnaire that asked them to check what they were feeling before or after listening to music or being exposed to colors.

e) Filipino Children's Music.

This refers to the ten Filipino children's music used as background in teaching addition and subtraction to induce happy emotion. They were the following titles:

1. Jack en poy;
2. Kumusta, Kumusta;
3. Kung Ikaw ay Masaya;
4. Leron, Leron Sinta;
5. Lubi, Lubi;
6. Magtanim ay di biro;
7. Pen Pen de serapen ;
8. Sitsiritsit alibangbang;
9. Paru-parung bukid;
10. May Tatlong Bibi

These songs were identified through an initial survey asking respondents what songs make them happy. Then another survey was done to identify the emotion felt by pupils before and after hearing the song. The top ten ranking songs that induced happy emotion were used in the experiment.

f) Colors

The Colors used in this study were Red, Yellow, Blue, Green, Orange, Purple, Brown, Grey, Rose, Silver, Gold, Black and white in their simple forms. The intensity, brightness and other characteristics of colors were not defined since the respondents may not be fully aware and knowledgeable of them. The simple colors as the pupils generally knew them were used.

1.13 Overview of the Thesis Structure

This study examined the effects of researcher's made emotion-based teaching aids that utilized happy emotion induced by Filipino children's music as background music and/or colorful materials in the performance of grade 1 Filipino pupils in addition and subtraction. The Chapters were designed to stand alone even though they are part of a unified whole. Thus, some materials may be found repeated in one chapter and the others yet great care were taken to avoid too much redundancies. Chapter 1 presents the Introduction which contains the background of the study, the problem, the research questions and the purpose of the study. It dwells on the recurring theme that there is a need to utilize the power of emotion in improving math performance. Chapter 2 contains the Review of Literature which offers an extensive discussion on the role of emotion in learning. It showed that in spite of the many studies that found emotions to be beneficial to learning, they were not fully utilized in the Philippines to improve the performance of pupils in mathematics. Chapter 3 presents the Research Methodology and Design. The procedure undergone by the researcher in his attempt to achieve the purpose of the research was explained and discussed. Chapter 4 presents the data and the findings of the study and Chapter 5 presents the Summary of Findings, Analyses, Conclusions and Recommendations. The appendices contain the Emotional-Based teaching aids and lesson plans used in this study together with the research instruments, tables and graphs and other pertinent documents and information for easy reference of the reader.

1.14 Summary

This chapter describes the background, purpose, the theoretical framework, the problems, the aims and the questions of this research. It also contains the justification and the significance of this study. The last section contains the organization of the chapters.

The study has for its background the current condition of the Mathematics performance of Filipino students which shows that even though the mathematic program in the Philippines used modern methods and strategies in teaching mathematics, the performance of grade 6 remained low thus the need to find other methods and strategies to improve and address the gap between the actual performance and the set standard.

The researcher believed that to improve the performance of Filipino students in Math, change must start from the beginning of the program in which the foundations are taught. The gap between the desired performance and the current performance of Filipino students in Math started in the early childhood and any attempt to improve the performance must start from the cause and from the foundational years.

This is the reason why grade 1 pupils were chosen as subjects. Since recent literature claimed that music used as background and/or color induces positive emotions and that positive emotions improved learning, this study set to identify what Filipino Children's Music that induce happy emotion can be used as background in the learning process and what Colors induce happy emotion in the

development of emotion-based teaching aids to improve the performance in addition and subtraction of grade 1 pupils.

The overarching objective of this research was to determine if the performance in addition and subtraction in Math of grade 1 pupils can be improved through the emotion-based teaching aids which utilized happy emotion induced by Filipino children's music used as background music and/or through the use of colors. From these objectives, three specific objectives were drawn and from these specific objectives, answers to questions were sought to five specific questions. The emotion-based learning aids were developed and implemented in an experiment where the improvements in performance in addition and subtraction of the control and experimental groups were compared to determine if there were statistically significant difference in the improvements brought about by the intervention.

This study is grounded on the Dynamic Systems Theory (Thelen, 2005) which posited that human beings are complex dynamic systems who are affected by emotions and on the Cognitive Emotional Pedagogy (Mäkivirta, 2002) which claimed that an individual learner can create meaning from his experience and that construction and retention of new concepts and skills is most effective if the learning content is associated with creativity and emotionally distinct experiences. These theories became the bases in conceptualizing emotion-based learning framework and the development of the learning aids to improve the performance of grade 1 pupils in addition and subtraction.

The result of this study may be of benefit to Curriculum designers, Policy makers, School headmasters and principals, teachers, young children and the Community as a whole who will be provided a new perspective on the importance and power of music, colors and emotions in learning.