## **CHAPTER 1: INTRODUCTION**

### **1.1 Background**

Sight-reading involved higher level of thinking process initiated by conceptual knowledge (Lehmann & McArthur, 2002, p. 135). Studies had shown that multiple cognitive and perceptive processes engaged simultaneously when performers read music by sight (Grutzmacher, 1987; Waters, Townsend, & Underwood, 1998; Wolf, 1976). According to Wristen (2005), some cognitive and perceptual studies had proved that brain carries more processing works, and more thinking modes involved during music sight-reading. In addition, sight-reading is not a particular musical skill but rather a combination of multiple cognitive abilities that shall be developed simultaneously, which are perception, kinesthetic, memory, and problem solving skills (Lehmann & Ericsson, 1993, 1996; Waters, Townsend, & Underwood, 1998; Lehmann & Arthur, 2002). Also, sight-reading associated with high demand of on-the-spot working memory (Humphreys, 2013; Kopiez & Lee, 2008). In order to improve sight-reading ability, these cognitive and perceptive abilities in sight-reading skills had to be exercised and promoted to a higher level (Eisner, 2002).

# **1.2 Statement of Problem**

Since music sight-reading involved higher level of thinking process, but none of the published music sight-reading methods strengthen the capacity of one's thinking ability towards the preparation to the complexity nature of sight-reading standard musical notations. The criteria in those published method books assumed the piano beginners have the ability to interpret the notations reading themselves. Piano beginners are expected to master this highly complicated skill by simply practicing to play the musical tunes (Nesbitt-Hawes, 2005). Hence, piano teachers often insisted hours of engaging beginners to practice and accumulating experience of reading unfamiliar music pieces to improve sight-reading skill. However, McPherson (2005) stated that engaging hours of practice did not contribute significantly towards sight-reading improvement. The lack of training towards one's thinking ability causes time-consuming development in reading and recognizing musical patterns.

Thus, what is the role of higher order thinking skills in the sight-reading ability? To better understand how students' sight-reading ability being affected by their thinking ability, researcher conducted this qualitative case study in order to examine the function of higher order thinking skills and techniques towards piano beginners' music sight-reading ability and development. Nevertheless, this observational research was intended to construct a discussion of learning and teaching approach, through recording the complex situations of teaching and learning for piano beginners; to describe a new paradigm of stimulating music reading development, through application of higher order thinking skills towards the sight-reading lesson contents consist of musical tunes, tonal patterns, and notations learned in beginners' piano lesson.

# 1.3 Purpose of the Study

The main purpose of this paper were:

- 1. To observe students' participation and commitment in each sight-reading lesson.
- 2. To investigate how higher order thinking skills play role in the whole process of teaching and learning of sight-reading on piano.
- To look into the contributions of higher order thinking skill towards the sightreading ability of piano beginners.
- 4. To analyze the students' sight-reading improvement that influenced by participating sight-reading lessons with higher order thinking skills.

# **1.4 Research Questions**

Based on the objectives stated above, the research questions were as below:

- Did the students committed and manipulated the lesson instructions well, as priority of further participation of the sight-reading lessons with higher order thinking skills?
- 2. What is the role and function of higher order thinking skills in teaching and learning during the sight-reading lessons?

- 3. What is the contribution of higher order thinking skills towards sight-reading of standard notations, in terms of absorption of sight-reading experience through instructions associated with higher order thinking skills being applied to the practicing of reading pitch and timing upon the musical tunes and tonal patterns in each lesson?
- 4. How does the students' sight reading ability being influenced, by comparing their sight reading ability before participate the lessons and after the lessons, in terms of pitch reading, timing interpretation, and fluency of playing?

# **1.5 Significance of the Study**

Researches had proven that various cognitive processes are involved in the mentality of a person during sight-reading performance. However, it was genuinely lack of stimulation practices that strengthen the thinking capability in order to cope with the greatly complex musical notations while performing the music, without opportunity to correct it within the time strain. Therefore, there is a crucial need to investigate the connection of thinking approaches applied and its stimulus effect towards sight-reading ability of the piano beginners.

In addition, plentiful of scientific and technical researches on piano sight-reading improvement had done over years. Nevertheless, the research of the process of grooming sight-reading ability in classroom shall be weighed in order to investigate how piano beginners read musical notations. Young piano beginners often faced a hardship of comprehending the meaning of playing piano fluently and accurately at the beginning stage of learning. Hence, it was being prejudicial to measure exact accuracy on their playing with scientific approach.

Hence, observations and pictorial explanation should be focused towards particular participants regarding their sight-reading performance and responses, to examine how they cope with the difficulties of reading, which is able to lead towards deeper analyses of these performance aspects, which are necessary for better lesson design. In addition, by focusing towards small amount of students with thorough observation might not assisting in looking into the students' sight-reading mind, but it contributed towards the discussion of different situations occur when the higher order thinking skills were applied into the sight reading lessons, such as the students' sight-reading progress, and their improvement through time.

# **1.6 Delimitation of the Study**

This qualitative case study was limited to a few aspects as discussed below: 1) nature and size of the subjects, 2) lesson content design and test excerpt design, and 3) other issue.

## 1.6.1 Nature and size of the subjects

This is a collective case study, which involved only four participants. This research was designed to have in depth approach with each of the studied subjects, but under the same condition. Even though each subject experienced the same sight-reading treatment,

their responses and development in their sight-reading ability was according to their own ability and improvement within that period of learning. The subjects were not being compared to each other in terms of their reading performance and sight-reading ability.

# 1.6.2 Lesson content design and test excerpt design

Students experienced an accumulated experience of practicing a variety of interval readings only within the middle-C position on piano for both hands in the five sight-reading lessons, according to piano beginners' syllabus of piano learning at the beginning levels. With aid of pilot study, each lesson has been fixed with the number of tonal patterns and musical tunes to be practiced and revised. The sight-reading excerpts were arranged in right hand, left hand and hands together performance for the examination of the subjects' sight-reading ability from their accumulated experiences of higher order thinking skills within the five lessons only. It is not within this study's concern of any varied contents and techniques of learning that could produce sight-reading outcomes, which will be equivalently discussed in this paper.

### 1.6.3 Other issue

Lehmann and McArthur (2002) stated that common problem in sight-reading involves pitches, rhythm, articulation, and expression. However, in this study, only pitch, timing, and fluency of students' sight-reading ability would be observed and discussed. There were no other musicality aspects, such as dynamics, expressions, finger techniques, phrasing, and tone quality involved in this research context. This is due to the limited sight-reading contents, and those were mostly presented in tonal patterns and short tunes, and it is too limited to be able to observe the expression and other performance ability from the lesson contents. In addition, in terms of relating the improvement of expression and performance ability with higher order thinking skills are still an issue that yet to be proved its practicability. The study became more centered by focusing particularly on the pitch and timing of sight-reading ability. This research did not concern upon gender issue. The students' sight-reading performance and comprehensiveness during the lessons would not be compared among each other according to their ages.

# **1.7 Definition of Terms**

The following presents the definitions and terms for this study as: 1) thinking skills, 2) higher order thinking skills, 3) sight reading, and 4) middle-C position on piano keyboard.

## 1.7.1 Thinking skills

Burns (2006) stated that thinking skill is an innate ability by human beings in order to determine cause and effect, between two or more events occurred. It was also being defined as patterns of thinking that stimulate learners to go beyond the ordinary recalling process of stored information in head, and enable them to discover and make sense of their world, to make reasons and to solve problems, as well as planning,

creating and inventing (ACCAC, 2007). However, thinking skills would normally refer towards higher-order actions, such as constructing, evaluating, analyzing, and problem solving (Butterworth & Thwaites, 2013; Dodd, 2004; King, Goodsman, & Rohani, 2005).

### 1.7.2 Higher order thinking skills

Since thinking skills generally described mental process thinking skills as involving determining cause and effect between two events, higher order thinking skills defined it in deeper way that comprises critical thinking, creative thinking, metacognition, logical thinking, reflective thinking, and problem solving (Churches, 2009; Dodd, 2004; Education in Japan Community Blog, 2008; Halpern, 1996; King, Goodson, & Rohani, 2005; Krathwohl, 2002; Mardigian, 2011; Nesbitt-Hawes, 2005). Thus, higher order thinking involves multiple thinking and cognitive processes to cope with complex situations (King, Goodson, & Rohani, 2005). Higher order thinking skills are used during solving unfamiliar problems, hesitations, and questions. Higher order thinking skills occurred when there were evaluation of concepts and knowledge, because facts and concepts only become true and strong when it was solidly held and believed (Brookhart, 2010).

However, higher order thinking skills are significantly supported and based on lower order skills (Anderson & Krathwohl, 2001; Krathwohl 2002; King, Goodson & Rohani, 2005; Mardigian, 2011; Marzano, 2000). Higher order thinking skills would not been triggered if lower order thinking skills were not grounded, and the foundation of lower order thinking skills shall not be devalued while operating higher order thinking skills

(Churches, 2009; Marzano, 2000; Munzunmaier, 2013; Munzunmaier & Rubin, 2013). In education planning, although thinking was often enhance level by level, but sometimes bridging orders or the levels allow educators to refer back previous skills in order to strengthen the thinking ability (Krathwohl, 2002)

Based on the research, five sight-reading lessons were being structured and adapted with higher order thinking skills into each lessons. The students participated in all lessons following the sequence of the lessons. Nevertheless, each lesson had involved with lower order thinking skills and higher order thinking skills simultaneously, with higher order thinking skills provided a more analytical way to determine the cause and effect within the context of tonal patterns and tunes in the lessons. The key verbs of the lower and higher order thinking followed by each lesson would be discussed further in Chapter two in order. The thinking processes described by the key verbs (in italic font) involved in each lesson are:

- Exchange tonal pattern- *comprehend*, *apply* exchanges of patterns (lower order thinking); *analyze* patterns by breaking and relate patterns, and *evaluate* patterns (higher order thinking)
- Substitute pitches in a tonal pattern- *comprehend* the substitution purpose, apply substitution (lower order thinking); *critical thinking* of selecting, *make decision* of substitution, *evaluate* substitution, *problem solving* (higher order higher)
- 3. Memory of tune- *remember* tunes, *retrieve* tunes from memory, *apply* arrangement of the tunes (lower order thinking); *coordinate* fragments, *problem solving* (higher order thinking)

- Compare music scores- *identify* differences, *compare* tunes, *locate* differences (lower order thinking); *differentiate* differences, *problem solving* (higher order thinking)
- Synchronize of music elements *Identify* content, *understand* concept (lower order thinking); *combine* elements, *coordinate* pitches (higher order thinking)

Thus, in this study, higher order thinking skills was defined as to practice the skills by thinking critically within the context of the musical tunes and tonal patterns, in terms of exchange tonal patterns, substituting pitches in the patterns, memorized and rearrange patterns, comparing and synchronizing patterns. It all served one objective that of providing opportunities for students to think and solve tonal pattern problems. The higher order thinking was occurred simultaneously with lower order thinking skills in order to provide holistic approach towards sight-reading learning. Hence, in each lesson, it is not necessary to start grooming the students' sight-reading ability from the lowest or the highest order of thinking skills in lesson plans. To engage with higher order thinking skills in learning, the sight-reading lessons in this study allowed students to explore the tonal patterns and short tunes more thoroughly and interactively.

# 1.7.3 Sight-reading

Sight-reading is a functional skill, essentially for western musical culture, but it is becoming more important for all fields and areas of music performances. It refers to coping with unrehearsed performance of music. (Kopiez & Lee, 2008) and unexpected changes within the music reading, playing the notes with coding rhythmic value at the

same time, but in a context that the person hasn't play the musical excerpt before (Pike, 2012).

# 1.7.4 Middle-C position on piano keyboard

It is a piano beginner method that involves only the learning of notes by sharing both thumbs on middle C on the piano, followed by note D, E, F, and G notes on treble clef by using right hand fingers, and B, A, G, F notes on bass clef by using the rest of the left hand fingers.

# 1.8 Summary

Chapter one presented the statement of problem of this study, which spoken a lack of higher order thinking skills as stimulation in improving students thinking ability before engaging in sight-reading tasks. This chapter also proposed the researcher's intention to examine the role of higher order thinking skills in sight-reading improvement. By referring to the research questions, this study discussed the connection of thinking approaches applied and its stimulus effect towards sight-reading ability of the piano beginners. In Chapter two, the literature review related with higher order thinking skills and sight-reading would be discussed in further.

### **CHAPTER 2: LITERATURE REVIEW**

#### 2.1 Introduction

It was being discovered that thinking skill is an umbrella term that authorized the various terminologies and models of thinking skills including higher order thinking skills. Plentiful of thinking models were mainly being derived from education objectives, and yet to be discussed in this Chapter. Thus, there is a necessary to include an overview of thinking skills before looking into the various higher order thinking models and categories that were derived from this broad term.

#### 2.2 Definition of Thinking Skills

Nowadays, human are living in a society with rapid changes. Therefore, it is crucial for human beings to adjust themselves in order to cope this society with speedy transformation day by day. In education, as students had earned rich opportunities to master basic learning skills in every learning situation, their thinking ability had to be enhanced critically in order to pass beyond conventional learning or basic materials and memorizing facts in school and life (Nesbitt-Hawes, 2005, p. 1).

As mentioned, Burns (2006) stated that thinking skill is an innate ability in order to determine cause and effect, between two or more events occurred. Determining cause and effect is to recognize reasons, or identify result caused by a particular event, or a previous action. The prerequisite of this thinking mode to be occurred is there must be

two existing events for determining cause and effect between them. A person who tries to make connection between two events shall "think", in order to identify the relationship between two or more events. One of the events might be the purpose, or might be a result of another event occurred (p. 3). For example, consider two events "A" and "B", thinking would only occur when there is an intention for learners to take action from A in order to reach B. The relationship between A and B could be in any form, it might be a problem-solving strategy, an improvisation, a modification, an arrangement, a comparison, a reason, cause, or connection between two events (p. 4). Therefore, it represents the ability of a person in making relations of what has been learned, in a deeper way, which the quality of learning is more crucial than the quantity of learning (ACCAC, 2007, p. 3).

Thinking skills were also referred to the ability of reshuffling the existing unit of learning, and to explore beyond its conventional way (ACCAC, 2007, p. 3). Thus, it was also being defined as patterns of thinking that stimulate learners to go beyond the ordinary recalling process of stored information in head, with another pathway of obtaining the information, to make reasons and to solve problems; as well as to plan, to create and to invent (p. 3). Human were born naturally with capability to think, but numerous evidences prove that we can learn to think more skillfully (p. 3).

McGuinness (1999) and Swartz & Parks (1994) stated that there were several taxonomies of thinking skills, and those taxonomies were important to explain thinking skills by categories and levels, which included sequencing and ordering information; sorting, classifying and grouping knowledge; analyzing, identifying part/whole relationships; comparing and contrasting; making predictions and hypothesizing (McGuinness, 1999, p. 6). Thus, the kinds of interaction and learning approach towards

the units of learning decides the ability of the person to obtain the finest and deepest understanding, and applying it within his social community (Eisner, 2000; Goh & Zhang; 2002; Vygotsky, 1978). These taxonomies would be discussed later in this chapter.

Thinking skills are the key in education context (Churches, 2009). Basically, teaching of knowledge might be easily forget, or obsoleted within a couple of years, but once someone required thinking skills, it will remain as a lifetime skill in that person (p. 9). Although commitment in learning is the priority of absorbing knowledge, when students are presenting a fact or stating a preference, they are not activating thinking skills in them, even though there were some considerable skills in order to do so (Butterworth & Thwaites, 2013). Although expressing facts is one part of contributing towards thinking skills, Butterworth & Thwaites (2013) stated that thinking skills only occurred when one is taking conscious effort within a situation more than expressing facts.

The goals of thinking skills are promoting students with skills to evaluate existing information, connect and interpret knowledge in order to obtain deeper understanding of the topic of learning, also providing practical strategies to apply in different situations (Dori et al., 2003). Besides, teachers are playing an important role of providing the proper "mental" links that allow students to extend their existing conceptual mental map with new learning (Vygotsky, 1978). Thinking is a cyclical process. With new information or in a new situation, the thinking process begins again (Tan & Law, 2002). Taggart, Ridley, Rudd, and Benefield (2005) strongly encouraged that children's thinking must be always challenged and supported, in order to lead them towards the direction of thinking in open-minded ways. Magill (2006) stated that applying thinking skills are a step of moving the students away from "comfort thinking zones", by

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presenting the students with new challenges and new ideas (p. 4). While guiding children to perform thinking, the ability to visualized image and formulate linguistic expressions allow cognitive agents to develop representations of knowledge and concepts (Puchta, 2012).

Regarding the mental process involved in thinking skills, Taggart et al. (2005) addressed another name towards these thinking processes as "information-processing skills" (p. 1). Taggart et al. (2005) summarized the main features, and possible type of activities recommended upon the thinking features, that educators shall take account in academic planning to foster students' thinking skills and promote more subtle knowledge gain for students:

- 1. Mapping Focusing Attention towards contents of learning, planning, charting
- Mental Vocabulary Exploration of more vocabularies, retrieving vocabularies from memory
- 3. Making hypothesis Analyzing cause and effect
- 4. Memory Memorizing Facts
- 5. Paired thinking Making Comparisons, Solving problems
- 6. Identify Character Classification of objects
- 7. Communication Making decisions

- 8. Symbolic play Memorizing, Exploring numbers, Making associations
- 9. Develops mental flexibility Categorizing, Sequencing, Creative thinking

In overall, since thinking skills involved great extents of brain work, Dodd (2004) addressed that thinking skills is always referring to higher order thinking skills, because the aspect of "thinking-learning" was far beyond just "rote-learning" (p. 4). King, Goodsman, and Rohani (2005) specified that thinking skills are referred to higher order thinking skills that includes constructing, evaluating, analyzing, and problem solving, critical, logical, reflective, metacognitive, and creative thinking (Butterworth & Thwaites, 2013; King, Goodsman, & Rohani, 2005).

Traditional education objectives were often revolved around the lower levels of the thinking model (Churches, 2009; Krathwohl, 2002). For example, most education methods often trained students to recognize basic material and obey instructions, which provide less opportunity to activate higher order thinking skills (Nesbitt-Hawes, 2005). But in 21<sup>st</sup> century, the learning focused on moving students from lower order thinking towards higher order thinking (Churches, 2009). In modern days, education is more than recalling information and rote learning (Halpern, 1996; Nesbitt-Hawes, 2005) Educators started to train students to plan, design, solve problems, organize, and conceptualize information (Nesbitt-Hawes, 2005). Hence, when thinking skills was mentioned and discussed upon children's academic learning, it was always significantly referred to the higher order of thinking level (Dodd, 2004; Mardigian, 2011).

# 2.2.1 Objectives and philosophies of teaching thinking skills

Mainly, the functionality of thinking skills was built through objectives and philosophies in education and curriculum planning. Later, thinking skills became the basement and foundation in any curriculum and academic planning.

In McGuinness's past research report in 1999, she addressed that:

- Quality of thinking processes and thinking skills raise educational standards for lifelong learning.
- A successful prototype for developing curriculum materials was identified, that is strong theoretical underpinning, well-designed materials, explicit pedagogy, teaching support and program evaluation.
- 3. Technology supports the enhancement of thinking skills.
- 4. Infusion approaches presented with opportunities for embedding thinking skills.

Walsh, Murphy and Dunbar (2007) summarized the teaching strategy that promoting young children's thinking skills in four phases (p. 2 - 3):

1. Tuning in phase: The role of an adult to observe, listen, encourage, and show understanding to the children before interfering with the children's play and activities.

- 2. Development phase: The adult uses modeling, framework and questioning strategies to enrich children's thinking experience by solving variety of tasks.
- 3. Creative phase: The adult provides active tasks for the children, to groom them to think 'outside the box', spot the importance and the sense of completing a task with imagination and motivation.
- 4. Reflective phase: The adult encourages the children to reflect on their experiences on solving a task.

In addition, Lynch and Walcott (2010) suggested that effective improvement in learning requires dealing with the information dealt by open-ended problem-solving, interpretations, and providing potential practical practices with the information that could produce wider range of different outcomes (p. 1-2).

In conclusion, to design curriculum or lesson plans that optimize learning, the strategies of implying thinking skills in reaching the learning objectives shall be varied accordingly. Eggen and Kauchak (2011) stated that if the objective of learning differs, the strategies created to teach and to reach those objectives must be different too. A teaching model is specifically designed to help students to reach that particular objective(s). The model provided guides and teaching instructions, and the learning skills being utilized and promoted through the model are the core of representing how knowledge being defined and absorb by students (p. 21).

## 2.2.2 Curriculum of thinking skills in academic and music teaching

The benefits of thinking skills had been promoted worldwide and being utilized in curriculum and academic planning. The following enclosed a few examples of curriculum with utilization of thinking skills.

In year 1999, The National Curriculum of United Kingdom compiled five higher-order thinking skills that benefited all educators and music educators. (Dodd, 2004; Taggart et al., 2005). *The Department for education and skills in United Kingdom* utilized the five thinking skills included music teaching, to support teachers academic plan as stated below, with music teaching as examples:

- Information-processing skills: locate and collect relevant information of music timbres in a music performance, sort and classify appropriate rhythm patterns that could create interesting accompaniments, compare the musical characteristics of two different musical pieces, and analyze the relationship of harmonic base and melodic phrase.
- Reasoning skills: give reasons and comments on the musical pieces in terms of musical patterns and characters, draw inferences by identifying time signatures and rhythmic content, using precise language to describe the musical content, making judgments about the music.
- 3. Enquiry skills: ask relevant questions to the music piece, stated problems, construct plans about composition and arrangement of music

- 4. Creative thinking skills: extend ideas, generate musical ideas, and look for alternative outcome and conclusion for ideas.
- 5. Evaluation skills: evaluating musical information, judging and describing the music, and having confidence towards the judgments (pp. 5 8).

The *Qualification, curriculum & Assessment Authority for Wales (ACCAC)* in year 2007 induced three current methods for teaching thinking skills:

- 1. Teaching of thinking: teaching of thinking skills as stand alone subject.
- 2. Teaching through thinking: utilize thinking methods to improve subject contexts.
- Cross-curricular infusion: restructuring lesson context to utilize teaching of thinking skills (p. 6).

Also, the recent publication from *European Association for Music in Schools* (EAS) in year 2013 has looked deep into the assessment of the artistic with thinking skills. Artistic is an inclusion of visual arts and musicality that actually fosters critical thinking skill.

In Malaysia, thinking skills had long being encouraged as a "mind-tool" in teaching and learning in all levels of education. It started formally in the early 1990s (Rajendran, 2001) when the Ministry of Education changed the teaching system by implementing thinking skills into the school curriculum, providing infusion approach of thinking skills. However, there were less than 10% of the local classroom teachings being implemented with thinking skills towards the students' learning, according to Rajendran's research on early 21<sup>st</sup> century education (p. 18)

The education field in Malaysia fully revised the entire objectives and philosophies of applying thinking skills in academic progress since 2002. The revision was aimed to provide proper thinking skills guidelines for Malaysian school educators so that they could apply such thinking models into their subject teachings. This revised guide published by the government provided Malaysian educators a thorough meaning and teaching plans about thinking skills through:

- 1. Understanding of the concept and the meaning of thinking skills.
- Ability to master the technique of applying thinking skills into teachings and learning.
- 3. Applying thinking skills in teaching and learning.
- 4. Spreading and sharing the concept of thinking skills towards other school educators.
- Motivating in terms of willingness to participate and learn more of the application of thinking skills for teaching, learning, and also its application in our daily life (p. 1).

The Thinking Schools International (TSI) in Malaysia was founded in September 2011. TSI is currently working closely with the Malaysian Ministry of Education on a major project, i-Think, to develop the utilization of thinking skills in all Malaysian schools. The Malaysian Government and *Agensi Inovasi Malaysia* (AIM) have created the i-Think project to equip Malaysia's next generation of innovators to think critically and be adaptable in preparation for the future. Currently, there are more than 1000 primary and secondary school teachers joining this project. It is to convey the concept of problem solving, creativity, and to become lifelong learners. This project is being emphasized in science and technology teaching in school.

## 2.2.3 Conclusion of thinking skills

In conclusion, thinking skills was being labeled as a mental action that is more advance and sophisticated than that of basic learning such as memorizing and identifying. It is a mental work that promotes the learning beyond the boundary of obeying instructions and following rules. However, the priority of engaging with thinking skills was one must able to commit to learning by mastering basic skills, and able to recognize basic materials, manipulating basic materials, and remembering facts. This is due to the thinking skills were only utilized upon the ground of existing units of knowledge. There is no thinking occur without prior knowledge and prior commitment into learning. Traditionally, since obtaining basic units of knowledge was the most static, and secure learning manner, it was sufficient as prerequisite to be encouraged to proceed further with the engagement of thinking skills. Effective lesson plans and curriculum shall be strategized upon the priority of basic skills, with consideration of relevant thinking skills that could lead to deeper and detail learning. As mentioned, thinking skills were normally referred as higher order thinking skills that shall be discussed in further.

### 2.3 Higher Order Thinking Skills

As mentioned earlier, it was found that the mental processes involved in thinking skills are normally being referred to higher order thinking skills, which are problem solving, critical thinking, evaluation, and other related skills that requires great brain works. These mental processes would be discussed in further as those are being characterized as higher order thinking skills.

## 2.3.1 Definition of higher order thinking skills

Higher order thinking is an authority term that comprises terms such as critical thinking, creative thinking, metacognition, problem solving, logical thinking and reflective thinking (Brookhart, 2010; Butterworth & Thwaites, 2013; Education in Japan Community Blog, 2008; King, Goodsman, & Rohani, 2005) Also, higher order thinking involves multiple thinking and cognitive processes to cope with complex situations (King, Goodsman, & Rohani, 2005; Quality Enhancement Plan, 2014).

Higher order thinking skills are used during solving unfamiliar problems, hesitations, and questions, it occurs when a person retrieved information from memory; it interrelates, rearrange, extends with new information, with the purpose of finding alternative answers in a situation (Lewis & Smith, 1993, p. 136). The purposes could represent an intention to make decision, producing new ideas, manipulating new objects and materials, predicting a situation, believe in something, and solving problems (p. 136). Most importantly, there must be certain degree of challenges in the situation itself (Butterworth & Thwaites, 2014, p. 1; Lewis & Smith, 1993, p. 136).

The outcomes of higher order thinking skills are decisions made, presentations, classifications, products and strategies that also encourage further growth in intellectual skills (King, Goodsman, & Rohani, 2005, p. 1; Lewis & Smith, 1993, p. 136). It involves interpret complicated substantial into fragments, finding relations, combining new and previous information creatively within the context, and also using all previous levels of thinking skills in making judgments (King, Goodsman, & Rohani, 2005, p. 20). To define higher order thinking skills more universally, it is about "insight, conceptual, creativity, and discovery" (Jonassen, 2000, p. 24; Nesbitt-Hawes, 2005, p. 11).

In education context, Magill (2006) suggested that higher order thinking skills were promoted when students meet cognitive conflicts and challenges (p. 4). In order to develop a consciousness and understanding of their own thought processes, students must be able to retrieve the vocabulary from their mind that allows them to reach the solution for a particular problem Magill also stated that students must be able to relate their knowledge with different context of daily life and school academic progress. Learning to solve problems is one form of transferring knowledge into relevant situations.

Therefore, effective learning strategies have to be encouraged in students' learning process, and to improve comprehension (King, Goodsman, & Rohani, 2005, p. 48). Learning strategies includes rehearsal, elaboration, organization, and metacognition, to regulate one's own thinking. The skills involved include highlighting, diagramming, visualizing, memorizing, and mnemonics. Dodd (2004) strongly promotes "mind mapping" as a powerful thinking tool, as mind mapping is a graphical technique that actually mirrors the way that human brain works (p. 10).

King, Goodsman and Rohani (2005) suggested references areas associated with higher order thinking skills for educators: 1) Cognition: the mental operations involved in thinking, 2) Comprehension: a process of construct meaning from information, 3) Creative thinking: brainstorming ideas, inventing, 4) Critical thinking: logical thinking, problem solving, self-correcting, sensitive, 5) Graphic frame: an organizing pattern to visually represent relationships, 6) Higher order thinking: understand, analysis, evaluation, 7) Inquiry: investigating beliefs, draw conclusion from beliefs, 8) Insight: "Seeing" a correct solution, change in perceptions, 9) Metacognition: being aware of monitoring, supervising, making executive decisions about one's own thinking process, 10) Problem solving: solving problems with application of more than one concepts, 11) Rational thinking: logicality, critical thinking and problem solving, 12) Scaffolding: support and guidance removed gradually until one can work independently, 13) Schemata: systems of relationships between concepts, 14) Scripts: simple routines developed through practices, 15) Transfer: the ability to apply thinking skills taught separately to any subject (p. 34).

In overall, higher order thinking skills is representing a thinking zone that comprises thinking dimensions that are operating critically upon existing knowledge, in order to reach purposes and objectives of learning. The dimensions of thinking included problem solving, critical thinking, transfer, logical thinking and metacognitive thinking. The functioning skills that operate within the thinking dimensions would be discussed in further later on.

## 2.3.2 Higher order thinking and lower order thinking

As mentioned, students must commit and manipulate the learning process with basic skills such as remembering and identifying materials, in order to utilize higher order thinking skills towards existing knowledge and materials. In differentiating some skills are as "higher order" than other skills, psychologists, educationalists, and philosophers had done much researches in order to put the skills into its ranking in thinking process (Butterworth & Thwaites, 2013). This distinction between two types of thinking orders were crucial because the skills would applied in different situation with different purposes. Lower order thinking represented the fundamental retrieval of knowledge, but higher order thinking means application of knowledge into purposes.

However, as agreed by experts, the activities that promoted analysis, evaluation, problem solving, decision making and creating upon existing knowledge would be categorized as higher order skills compared with lower order skills such as recall and understand facts. In general, some types of thinking skills are higher order than others, regarding its requirement of greater cognitive processing than that of other thinking types (Quality Enhancement Plan, 2014, p. 14). Different taxonomies were used to describe the mental process of these thinking skills, and put them in ranking from lower order to higher order by considering the mental process involve in it. Creative thinking, critical analysis, evaluation, and solving problems were always the top of the taxonomies.

However, since higher order thinking skills were distinguished with lower order thinking skills and were often activated during complex situations, but it were largely supported and based in lower order skills (Anderson & Krathwohl, 2001; King, Goodsman & Rohani, 2005; Krathwohl 2002; Mardigian, 2011). Thinking shall be

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enhanced level by level, but sometimes bridging orders or the levels allow a person to refer back previous skills in order to strengthen the thinking ability, therefore it is not often necessary to start from the lowest order of thinking skills in academic (Krathwohl, 2002; Lewis & Smith, 1993). There are general agreements that lower order and higher order thinking skills can be distinguished (Lewis & Smith, 1993).

However, sometimes a person needs higher order thinking to solve a problem, but another person only needs lower order thinking skills to overcome the hassle, which activating the level of thinking skills varied according to individual. The similar skills to solve the same problem might be lower order thinking skills for someone, but it might be higher order thinking skills for another person. Lewis and Smith (1993) addressed that learning to be effective in higher order thinking is very crucial for everyone, because it is not a skill only owned by "gifted children", the failure to develop higher order thinking skills in academy would cause learning difficulties in elementary school and even in higher grades.

On overall, while considering which lower order skills or higher order skills to be included in lesson planning or curriculum planning, educators are not necessarily insisted to start the lesson from the bottom level of thinking towards the highest level of thinking, the bridging and the alternates of thinking skills involved in the lesson planning are depending on educators individual preference.

In the following sections, the discussion of higher order thinking skills in this study would focused into two areas: a) reviewing cognitive taxonomies that labeled the levels of the thinking skills from lower order to higher order; this section also discussed the skills that are operating "higher orderly" in each taxonomies, and b) from the top level of the cognitive taxonomies were higher order thinking skills, and discussed the categories and types of higher order thinking skills that being ranked as higher order thinking, which were related in this study. The levels from lower order thinking skills towards higher order thinking skills would be discussed in prior of the categories of higher order thinking skills, because higher order thinking skills were not activated if no lower order thinking skills are involved and grounded (King, Goodsman & Rohani, 2005; Krathwohl 2002; Magill, 2006).

## 2.3.3 Cognitive taxonomies

The following section reviews major cognitive taxonomies, which consist levels from lower order thinking skills towards higher order thinking skills. Higher order thinking skills are always at the top of cognitive taxonomy and grounded with lower order thinking skills. In these different taxonomies, higher order thinking skills shares the general definition and thinking process but different in terms of perspectives and level divisions.

#### 2.3.3.1 Bloom's taxonomy

The previous Bloom taxonomy had being revised into a new one in 1990 by former students of Bloom, which were Lorin Anderson with David Krathwohl (Anderson, & Krathwohl, 2001; Churches, 2009) Churches (2009) stated that Bloom's new taxonomy follows the thinking process relevantly, it is about the vehicle of achieving the higher order thinking. The six levels of cognitive domain in Bloom's taxonomy had displayed

the appropriateness of how information learned and memorized, and information can be made richer in analyze, evaluate, and improvise based on the learned information (Churches, 2009; Mardigian, 2011). Also, the 'create' level calls for creative behavior, in order for learners to make new constructions of product by combining, or designing a product (Munzenmaier & Rubin, 2013). Therefore, in Bloom's cognitive taxonomy, higher order thinking is being considered as the "top end" of the taxonomy (Brookhart, 2010). Figure 2.1 showed six levels of cognitive domain of Bloom's new taxonomy, from the bottom to the top level.



Figure 2.1 Six levels of cognitive domain from Bloom's Taxonomy

Each level in the cognitive domain was included with regarding key verbs. The key verbs that mentioned in every level of Bloom's Taxonomy are most critical, because the verb represents the actions, and the task that the learners must do in order to perform the regarding level of thinking, and meet the regarding education objective (Munzenmaier, 2013, p. 21).

(a) Remember

Remembering is the most fundamental step of applying one's ability in thinking (Mardigian, 2011). Learners only commit to facts and memory of facts in this level (p. 2). The key verbs that were involved in this level for remembering were: choose, match, recall, select, name, show, tell, direct, locate, recognize, list, describe, identify, retrieve, and find (Anderson, & Krathwohl, 2011; Churches, 2009; Krathwohl, 2002; Mardigian, 2011; Munzenmaier, & Rubin, 2013). Even though recall of knowledge is the lowest order of thinking skills but it is crucial to learning, which this level also strengthened by its application in higher order thinking skill activities (Churches, 2009). Remembering knowledge is probably the largest ground of thinking in order to solve new problems (Anderson and Krathwohl, 2001)

### (b) Understand

At this level, the learners retrieve knowledge to construct meaning (Mardigian, 2011). This level probably served most important based in every academic planning because students are often required to understand concepts and build connections towards "new" and "previous" knowledge (Anderson, & Krathwohl, 2001). According to Churches (2009), understanding forms relationships and relates knowledge (p. 17). The key verbs in this level are: interpret, summarize, infer, paraphrase, classify, compare, explain, exemplify, contrast, illustrate, translate, demonstrate, and rephrase (Anderson, & Krathwohl, 2011; Churches, 2009; Krathwohl, 2002; Mardigian, 2011; Munzenmaier, & Rubin, 2013).

(c) Apply

Once learner perceived "facts" and understand the meanings, it is sufficient to begin the application of knowledge, towards situations where the learned knowledge could access through products and models (Churches, 2009). The key words that lead educators for academic planning in this level are: carry out, use, execute, implement, show, exhibit, develop, build, solve, choose, interview, experiment, select, provide, respond (Anderson, & Krathwohl, 2011; Churches, 2009; Krathwohl, 2002; Mardigian, 2011; Munzenmaier, 2013; Munzenmaier, & Rubin, 2013).

(d) Analyze

This level involved a more detail knowledge interpretation of concepts and parts. Analyze means breaking concepts into parts, seeing the interrelationship of the parts as and overall structure and purpose (Anderson, & Krathwohl, 2001; Churces, 2009; Mardigian, 2011). The key verbs of this level are: compare, organize, deconstruct, attribute, outline, find, structure, integrate, simplify, discover, take part in, distinguish, differentiate, examine, describe relationships, and categorize (Anderson, & Krathwohl, 2011; Churches, 2009; Krathwohl, 2002; Mardigian, 2011; Munzenmaier, 2013; Munzenmaier, & Rubin, 2013). As higher order thinking skills, evaluate involved mental actions that making judgments, giving opinions, determining statement and ideas (Churches, 2009; Mardigian, 2011) The key verbs are: recommend, defend, assess, determine, justify, opinion, prioritize, perceive, prove, decide, influence, check, hypothesize, critique, experiment, judge, test, detect, monitor (Anderson, & Krathwohl, 2011; Churches, 2009; Krathwohl, 2002; Mardigian, 2011; Munzenmaier, 2013; Munzenmaier, & Rubin, 2013).

## (f) Create

When one person's thinking achieving this highest level in Bloom's cognitive taxonomy, and when a person is able to analysis and evaluate ideas, now the person is ready to develop new ideas and models with existing knowledge (Mardigian, 2011). Anderson and Krathwohl (2001) stated that at this level, one should be able to put elements together, organizing materials into a new structure. The key verbs in this level are: design, construct, plan, produce, invent, devise, make, improve, predict, imagine, build, propose, create, maximize, combine, elaborate, minimize (Anderson, & Krathwohl, 2011; Churches, 2009; Krathwohl, 2002; Mardigian, 2011; Munzenmaier, 2013; Munzenmaier, & Rubin, 2013).

(g) Conclusion of Bloom's taxonomy

Eisner (2000) stated what is taxonomic about the taxonomy of the six cognitive levels, is that each following level depends upon the student's ability to perform at the level or levels that are heading towards it. The taxonomy was not merely a classification scheme but it was an effort to hierarchically order cognitive processes (p. 3). The taxonomy was classified under the philosophy of "during a learning process, the current level must be mastered before the person can move to the next level" (Abeles, 1994; Eisner, 2000; Munzenmaier & Rubin, 2013). Churches (2009) stated that the taxonomy is a scale of characterizing the thinking skills from lower order thinking skills to higher order thinking skills:

Before we can understand a concept we have to remember it Before we can apply the concept we must understand it Before we analyse it we must be able to apply it Before we can evaluate its impact we must have analysed it Before we can create we must have remembered, understood, applied, analysed, and evaluated. (p. 6)

However, as mentioned, even though each level of thinking skill must be mastered before promoting to the next level as mentioned above, some thinking levels are not necessary included in all activities or lessons when educators are planning for lessons and curriculum; it is also not necessary to start with the lowest order thinking in each lesson because some activities may not necessary to reach the highest order of thinking which is to evaluate and to create, this is depending on individual choice (Churces, 2009, p. 6; Krathwohl, 2002). The most important objective is lying within the learning

elements and contents, it must be coherent and rational to be taught and learned by students (Churches, 2009, p. 6).

### 2.3.3.2 Marzano's taxonomy

Although Bloom's taxonomy played significant role in education field, Marzano (2000) pointed out that Bloom's taxonomy was not supported powerfully by researches. Marzano (2000) addressed that cognitive process was simply not true to be occurred by the level as how Bloom addressed in his taxonomy. Marzano (2000) introduced a new taxonomy, which consisted of four levels of thinking skills in its cognitive domain, and followed by metacognition and self-system at the top of the thinking model as higher order thinking level, which is a total up of six levels similarly as Bloom's taxonomy, as shown in Figure 2.1 (Brookhart, 2010; Marzano, 2000; Marzano, & Kendall, 2007).



Figure 2.2 Six levels of cognitive domain from Marzano's Taxonomy

Similar with Bloom's taxonomy, each level also consist of mental processes (key verbs) that described the mental action in each level. Marzano & Kendall (2007) had reviewed the taxonomy again and published it in year 2007. They addressed that the taxonomy is very important in formulating and outlining curriculum, with the more systematic classification of education objectives in future.

# (a) Retrieval

This is the fundamental thinking level of Marzano's taxonomy. In this level, learners must able to execute knowledge solidly. Educators must design the curriculum in such a way that directs the students to remember the facts straightforwardly (Marzano, & Kendall, 2007). The mental process that involved in this level are: recognize, recall, and execute (Marzano, 2000; Marzano & Kendall, 2007; Matthews, 2011; Pleagle Trainer Blog, 2014) In this level, students are able to demonstrate, show, make, complete and drafted information; exemplify, label, state information on demand; identify, select, and determine whether information is true or inaccurate (From Bloom to Marzano, 2014; Matthews, 2011).

### (b) Comprehension

In this level, it involved two mental operations (key verbs), which are integrating and symbolizing (From Bloom to Marzano, 2014; Marzano, 2000; Marzano, & Kendall, 2007; Matthews, 2011). The integrating operation could be taught with general patterns in which how knowledge is being organized: characteristic patterns, sequence patterns,

process-cause patterns, problem-solution patterns, and generalization patterns (p. 152). In order to master the thinking ability in this level, the incorporation of knowledge with general patterns had to be referred to: a) search for a pattern in the knowledge that probably suits with the nature of the knowledge, and then b) structure the regarding knowledge using that particular pattern (p. 152). Symbols are the form that typically described as to represent the knowledge. It could be in language form, or in pictorial form (p. 152).

# (c) Analysis

When a student was able to structure their knowledge as in previous thinking level, the way of structuring knowledge was promoted to more analytical thinking in this level. Marzano divided this level into five mental processes: matching, classifying, analyzing errors, generalizing, and specifying (From Bloom to Marzano, 2014; Marzano, 2000; Marzano, & Kendall, 2007; Matthews, 2011). Matching involved identification of similarities and differences in materials; classifying shared the similar meaning but including coordinating materials into its attributes; analyzing errors involved identify errors in a procedure; generalizing included the construction of concept; specifying is about making judgment, predicting what would happen, and also argument for information (From Bloom to Marzano, 2014; Marzano, 2000; Marzano, & Kendall, 2007; Matthews, 2011).
#### (d) Knowledge utilization

In this level, the mental process had been promoted towards a higher order of thinking that involved decision-making, problem solving, experimenting, and investigating (From Bloom to Marzano, 2014; Marzano, 2000; Marzano, & Kendall, 2007; Matthews, 2011). Decision making involved selecting best way or best solutions for a situation; problem-solving probably involved how a person overcome problems; experimenting is putting the solutions or strategies into test; investigating was to find out why or how one phenomena happens (From Bloom to Marzano, 2014; Marzano, 2014; Marzano, 2000; Marzano, & Kendall, 2007; Matthews, 2011).

(e) Metacognition

Metacognition is the ability to think about thinking (Brookhart, 2010; King, Goodsman, & Rohani, 2005; Marzano, 2000; Marzano, & Kendall, 2007; Matthews, 2011). Metacognitive system is controlling the thinking process and it standardizes all other systems (Matthew, 2011). It involved mental process of being conscious of monitoring and making decisions about own thinking process (King, Goodsman, & Rohani, 2005). In Marzano's description about metacognition, it involved specifying learning goals, monitoring the execution of knowledge, monitoring clarity, and monitoring accuracy (Marzano, 2000; Marzano, & Kendall, 2007; Matthews, 2011).

#### (f) Self-system thinking

The highest-level Marzano's taxonomy is self-system thinking. When students were able to monitor own thinking process, this level is crucial because students confront to a situation of whether this higher order thinking task is important to him or her (Matthews, 2011). This level executes the students believe about the importance of knowledge, beliefs about efficacy, and emotions associated with knowledge (From Bloom to Marzano, 2014; Marzano, 2000; Marzano, & Kendall, 2007; Matthews, 2011). In addition, students' motivation often contributed towards the motivation of completing the task, as well as students' effectiveness, and it involved their self-belief that they could obtain great resources to complete the task (Matthews, 2011).

### (g) Conclusion of Marzano's taxonomy

Bloom scaled the levels of thinking from lower order to higher order skills in his taxonomy and sounded more technical and focuses towards the skills itself (Anderson & Krathwohl, 2001). Whereas Marzano (2000) scaled lower order thinking skills towards higher order thinking skills, involved more philosophical ideas of the thinking skills. However, their explanations and definitions of lower order and higher order skills were revolving around the similar key verbs and terms that operates within the regarding levels of skills. Thus, both share the same meaning of higher order skills were grounded at lower order skills. Even though Marzano did not mentioned the role of the sequence of thinking levels involved in curriculum planning, but he suggested that the taxonomy is very important for categorization of education goals.

### 2.3.3.3 Integrated thinking model

One of the most recent but detailed higher order thinking skill models was that developed by the Iowa Department of Education in 2009 (Jonassen, 2000; Nesbitt-Hawes, 2005). This model consisted of three levels of thinking skills ranging from lower order to higher order thinking. Each levels also consisted key verbs that describes the mental process in each level.

(a) Content and basic thinking – accepted knowledge

This level basically related to traditional learning (Nesbitt-Hawes, 2005). When learning take place, it must start with construction and recall of knowledge before thinking critically and creatively (Nesbitt-Hawes, 2005). The mental processes involved in this level are:

- 1. Problem Solving: sensing the problem, researching the problem, formulating the problem, finding alternatives, choosing the solution, building acceptance
- Designing: imagining a goal, formulating a goal, inventing a product, assessing the product, revising the product
- 3. Decision making: identifying the issue, generating the alternatives, assessing the consequences, making a choice, evaluating the choices (Iowa Department of Education, 2009).

## (b) Critical thinking - reorganized knowledge

Critical thinking involved reorganization of knowledge towards more meaningful way (Iowa Department of Education, 2009; Jonassen, 2000; Nesbitt-Hawes, 2005) The subskills involved with descriptions are:

- 1. Analyzing: recognizing patterns, classifying, identifying assumption, identifying the main ideas, finding sequence
- Evaluating: assessing information, determining criteria, prioritizing, recognizing fallacies, verifying
- 3. Connecting: comparing/contrasting, logical thinking, inferring deductively, identifying casual relationships (Iowa Department of Education, 2009)
- (c) Creative thinking generated knowledge

Creative thinking generated knowledge through the known knowledge (Nesbitt-Hawes, 2005). This level of thinking combined all the previous levels and sub skills, put to a center and oriented the thinking process in broader way (Nesbitt-Hawes, 2005). This level is probably the level that involved most complex thinking processes, it involved:

- 1. Synthesizing: analogical thinking, summarizing, hypothesizing, planning
- 2. Elaborating: expanding, modifying, extending, shifting categories, concretizing

 Imagining: fluency, predicting, speculating, visualizing, intuition (Iowa Department of Education, 2009; Jonassen, 2000; Nesbitt-Hawes, 2005).

(d) Conclusion of Integrated Thinking Model

Similarly with Bloom, creativity is the highest level of this integrated thinking model. But the classifications and scales of this model were more general.

# 2.3.3.4 Development of higher order thinking skills

King, Goodsman & Rohani (2005) stated that there were three levels of development of higher order thinking skills, which are prerequisites, bridges, and higher order thinking as the final level.

Prerequisites of thinking skills involve three aspects, which are content and context, lower order thinking skills, dispositions and abilities, how students develop thinking skills in academic learning depends on how content and context interplay with students' lower order thinking skills, and abilities (King, Goodsman & Rohani, 2005). Because any lesser degree of being immerse in prerequisite level would actually causing delay in learning, confuse of learning, inefficiency in absorb and output, frustration, and termination of effort for the next learning (p. 38). King, Goodsman & Rohani (2005) stated that when comes to disposition and abilities; it plays a great part in a person's thinking process. It represents a "habits of mind". It forms a person's desire to seek for

accuracy and clarity, and being open-minded to absorb new ideas, forming learning direction, which could lead to critical thinking, and also creative thinking (p. 38-39).

In bridges level, students bridging lower order thinking to higher order thinking (King, Goodsman, & Rohani, 2005). Thus, all dimensions of content and context in lower order thinking helps to develop the connections towards the higher order thinking (p. 39). In this level, students able to build interactions among different theories, evaluating the materials, making inferences, constructing relationships, and analyzing the cause and effect of the concept (p. 39). This level is a platform that enhances students' ability to produce linkages of knowledge, which would be retrieved during higher order thinking as problem solving strategies and critical thinking strategies (p. 39). Students are growing mature in terms of mentality and stepping into challenging phase of thinking.

King, Goodsman and Rohani (2005) addressed that higher order thinking skills were actually influenced by the condition of the problem (p. 40). Besides, metacognitive thinking is one of the thinking skills that connect all mental processes in higher order thinking skills together in one (p. 40). However, it is also a part of higher order thinking skills (p. 40). Higher order thinking also involved approaches to experiences, and responses towards problem-solving situations (p. 40). In this level, activities that promote higher order thinking shall link problem finding and creativity together, by encouraging planning skills, self-monitoring skills, self-adjustment towards problem-solving situations, and able to detect incompleteness, trouble, contradictions, and inequity in the task (p. 40).

(a) Conclusion of development of higher order thinking skills

Similarly with integrated thinking model, the scattering of the levels of thinking was more general in their description of the thinking skills. King, Goodsman & Rohani (2005) explained the development of the thinking skills mainly towards the stages that one person shall went through during thinking, rather than scaling it into discrete levels like previous taxonomies. As mentioned in the development of higher order skills, higher order skills must be activated, provided with basic skills as prerequisite. When lower order thinking and higher order thinking was linked and connected, students mentally were securely promoted towards more sophisticated thinking mode during learning. Prerequisite is equivalent to lower order thinking skills, bridging is equivalent to the thinking levels in the middle of taxonomies, and higher order thinking skills represents the top part of the taxonomies.

## 2.3.3.5 Conclusion of taxonomies and thinking levels

The absorption and commitment towards learning only being considered as completed, if the students had undergone the thinking levels from the bottom towards the top of the taxonomies. The opportunity to obtain finest learning, gaining experience in learning, and increase sensitivity to problem, were only occur if someone engage towards higher order thinking skills. For example, experience and sensitivity to problem came from consistent engagement in organizing knowledge, and interpreting knowledge. In other words, higher order thinking skills must be practiced consistently in variety learning situations in order to obtain the finest form of knowledge. Generally, in the taxonomies, the lower order thinking skills were involving recall, memory, identify, retrieve, find,

locate problem; whereas higher order thinking skills often related to critical thinking, creative thinking, problem solving, transfer, coordinating, evaluating, synthesizing, organizing, structuring, and elaborating.

### 2.3.4 Higher Order Skills in Different Dimensions

In this section, higher order thinking skills, which appeared in the top level of mental process in the taxonomies and thinking models that had discussed above, would be further discussed in its different dimensions and applications. It is not difficult to discover that when discussing about higher order thinking skills, it involved transfer, critical thinking, problem solving and other terms that might overlap in meaning and the definitions were similar but different in context; that causing great arguments about the separation of terms and its categories (Brookhart, 2010; Butterworth & Thwaites, 2013; Lewis & Smith, 1993; Nesbitt-Hawes, 2005). However, these terms were representing a more organized and more directed way of looking into the complex nature of higher order thinking skills. Without these terms, discussion of higher order thinking skills might be often misleading and confusing.

#### **2.3.4.1 Higher order thinking as transfer**

Anderson and Krathwohl (2001) revised Bloom's taxonomy and promoted learning as recall (lower order thinking skills) and learning as transfer (higher order thinking skills). In Brookhart's definition of higher order thinking skills, he stated that higher order thinking involved transfer, which was being defined as "meaningful learning"

(Brookhart, 2010, p. 5). The goal of teaching thinking as transfer related to groom students to apply the skills towards the learning of new knowledge in a new situation, and knowing how to "transfer the old to the new one" (King, Goodsman & Rohani, 2005; Magill, 2006, p. 4; Brookhart, 2010, p. 5). However, the "new" knowledge does not necessarily refer to new learn knowledge, but it could be the existing knowledge but with applications of the knowledge that students had not thought of before (Brookhart, 2010, p. 5). This is a form of higher order thinking that enables students to relate the concepts beyond their existing application of knowledge (p. 5).

For example, teacher assigned students to do a task but not guiding them thoroughly, the purpose is to allow students to perform higher order thinking skills without depending on the teacher's help (Brookhart, 2010, p. 5). In addition, the objectives of education is to promote remembering and maintaining of knowledge and information for students, another objective is to promote transfer, which required students to use what they had remember and maintain in mind for future use (Anderson & Krathwohl, 2001, p. 63)

#### **2.3.4.2** Higher order thinking as critical thinking

Critical thinking is a specific type of higher order thinking skills, which is much detail and sophisticated than the lower skills such as memorizing and recalling (Quality Enhancement Plan, 2014, p. 14). Discussing higher order thinking skills as critical thinking could involve plenty of similar terms equivalent with critical thinking, such as problem solving, creative thinking, and decision making. In order to make the definition of higher order thinking skills clearer, Lewis and Smith (1993) stressed that the term shall be focused on critical thinking and problem solving, but not mixed and matched with other terms (p. 131). He considered critical thinking has its equivalent meaning with problem solving and evaluation (p. 134).

More recently, critical thinking had been discussed separately with problem solving skills. Critical thinking was being explained as the ability to distinguish between facts and opinions or personal feelings, making judgments and inferences of a situation (Nesbitt-Hawes, 2005, p. 10). The separation in discussion of these two terms helps educators to overcome the confusion between critical thinking and problem solving (Lewis & Smith, 1993, p. 136).

Forster (2004) defined critical thinking as focusing priory on making discriminations and judgments in the territory of reasoning (p. 6). Reasoning is one of the criteria for students to think critically, and it involves two thinking styles as "objective thinking" and "scientific thinking" (p. 5). Both these thinking styles also involved problem solving and logical thinking, but sometimes it could be very subjective depends on the thinker. The processes involved in objective thinking and reasoning include categorization, representation, transformation, relationship, construction, and judgment. In scientific thinking, the thinker must perceived experience and intelligences in language, vocabulary, and masteries of mathematic skills before thinking with reasoning. Barahal (2008) defines critical thinking as a process that included reasoning, investigating, questioning, observing, solving complexity, describe and narrate, discover and explore with points, relating and comparing (p. 299).

In fact, critical thinking is portraying the person's willingness to plan and strategize, keen to accept new options and new opportunities, and acknowledge new solutions in order to encoubter existing problems (Halpern, 2003; Quality Enhancement Plan, 2014) Halpern (2003) suggested that critical thinking is a form of direct thinking because it motivates a person to obtain a desired outcome (Brookhart, 2010; Halpern, 2003. Brookhart (2010) stated that critical thinking is "being able to think", and produce reasonable judgment and critique in a situation (p. 5). People who are "able to think" were crucial to exercise wisdom and always deciding the best in life (p. 5 - 6). Students shall be prepared to think reasonably and making decisions in order to face tasks in school and life.

# 2.3.4.3 Higher order as problem solving

Experts could define the word "problem" differently. Brookhart (2010) thinks that problem is a target that is unable to be simply solved by a static solution, or a memorized strategy (p. 7). Brookhart (2010) stated that problem solving required nonautomatic strategy to reach its target:

Every academic discipline has problems. Some are closed problems, like a set of math problems designed to elicit repeated practice with a particular algorithm. But many problems are open-ended, could have many correct solutions or multiple paths to the same solution, or are genuine questions for which answers are not known... People solve problems in many different ways, depending on the values and assumptions they bring to the task. (p. 7) There is a role of creativity thinking and critical thinking in problem solving (Brookhart, 2010) In order to solve problems, recall and identifying problem must take place, able to create something new to solve the problems. Thus, Brookhart (2010) also defined problem solving as higher order thinking skills, which one person could solve problems and thinking creatively to solve problems.

"Problem" can be described as a situation that caused human a difficulty or trouble (Butterworth & Thwaites, 2013, p. 13). Problems often being solved under a little more detail and deeper thought, and it shall be based on logicality. For example, people used to solve problems in daily life that related to mathematics, shapes, numbers, languages, words, concepts and strategies, and problem solving could be rewarding at some times. Thus, Butterworth & Thwaites (2013) thinks that critical thinking and problem solving are two different disciplines. Critical thinking might be carried philosophically and textually, while problem solving involved physical solutions and often contain numerical information (Butterworth & Thwaites, 2013; Lewis & Smith, 1993).

According to Butterworth and Thwaites (2013), the process of problem solving involved:

- 1. Relevant selection: identify what are important to be solved within a mass of data
- Finding procedures: Combine or breaking information to figure out a way to solve a problem
- 3. Identifying similarity: able to identify similarity between new and old information

#### 2.3.5 Summary of higher order thinking skills

As mentioned, experience obtained in any learning situation only occurs when someone engaged with higher order thinking skills, because finest form of knowledge was only obtained through consistent practice with higher order thinking skills, with support and grounds of lower order thinking skills, which are the manipulation of the basic skills in any learning situation. In short, higher order thinking skills as transfer encourage students to apply old knowledge towards new situation; critical thinking encourage students to strategize and plan for the seeking of new knowledge based on the person's experience and intelligence; problem solving is more of a general term that intersects with the other dimensions of higher order thinking skills, it is involving the facing of situation or a problem that requires deeper thought in order to solve the problem. The higher order key verbs such as evaluate, coordinate, organize, elaborate, analyze, and differentiate were operating the higher order thinking skills, and there were being categorized as levels of thinking at the top of each taxonomies that being discussed previously.

It is discovered that although taxonomies were constructed differently in terms of levels of thinking and categorizes of the thinking processes, but as universal, the higher order thinking skills in each model are make up of its criteria to solve complex situations when lower order thinking did not adequately contribute to it. Higher order thinking skills were required when there is a certain degree of challenge in the task itself. These thinking skills were higher order due to its great cognitive extends in it. In addition, there were considerations of children's mental development while deriving the cognitive processes in the taxonomies.

#### 2.4 Children's Mental Development

The mental growth of children greatly influences the "thinking skills" curriculum planning and appropriateness of a teaching model for most music educators (Stuber, 2007). It is important to understand children's development because it contributes to the academic design, which included consideration of children's readiness to accept the instruction, the instructions' material, and most importantly the environment of the instructions being conducted, (Abeles, 1994).

Piaget had presented four stages of mental developmental process of children – sensorimotor, preoperational, concrete operational thought, and formal operational thought to explain his theory of Cognitive Development (Abeles, 1994), as shown in Table 2.1. In this study, the four subjects age 7 to 10 are in concrete operational stag

Berk (2001) stated that children at the age of concrete operational stage show several characteristics that represents their thinking ability and potentiality in learning and interacting with their environment, which is important for the suitability of curriculum design. Berk (2001) stated that in this stage, the lessons or courses design were to extend their thinking potentiality to the fullest, and to enrich their living life with explorations. The characteristics of concrete operational stages were being shown in Table 2.2.

Stage	Age	Characteristic	
Sensorimotor	Birth – 2	Attempt to communicate with environment, rely to senses around them. Develop awareness of sound and senses. React to music. Learn through imitating fragments. Can improvise in unstructured manner.	
Preoperational	2-7	Engaged in egocentrism and symbol association. Learning surrounded with language acquisition. Still explore world through senses, but with visual guides and cues.	
Concrete operational	7-11	Experience cognitive transition, becoming mature. Comprehend knowledge better. Able to classify objects with more details and specific attributes. Could perform more mental complexities.	
Formal operational	11 – 16	Perform more systematic thinking. Able to create strategies to solve problems.	

# Table 2.1: Jean Piaget's Children Four stages of Cognitive Development

<b>Table 2.2:</b>	Characteristics	of Piaget's C	Concrete Operations	Stage (Ages	7-11)
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Skills	Characteristics	
Classification	Could sort out color, size, shapes in one time. Understand relations and connections between objects, animals and people, and able to apply them in daily life.	
Seriation	This skill developed at this stage. Able to sort objects in sequential order according to particular characteristic.	
Conservation	Could perform thinking with more general angles	
Reversibility	Able to think logically on what is done and could be undone at the same time. Able to think forward or backwards towards a starting point.	

Schmalstieg (1974) also stated that the "golden age" for children in developing musical interests and attitudes are between ages three to eleven. It involves discovery of sound, forming of musical concepts, differentiations and similarity of tonal and rhythm patterns, and make meaning of musical sound (p. 143).

Epstein (2003) stated that even children at age three to six are capable of making thoughtful decisions, observing surroundings, and deciding their own behavior on handling such environment. She asserted that young children should have the opportunity to make their own choices and plan of works or projects.

In fact, Lynch and Walcott (2001) stated that every child performs different patterns of thinking skills, but also respond differently to what they do in classroom individually. However, these facts show that better thinking and practical problem solving skills would promise in higher education performances (p. 1). Walsh, Murphy and Dunbar

(2007) emphasized that there were three main factors that played a role in fostering the thinking ability of children: 1) role of adults, 2) role of environment, and 3) role of children participating in the thinking environment.

Walsh, Murphy, and Dunbar (2007) also suggests that to fully support the development of children's thinking, adults need to pay attention to the following six key areas:

- 1. Social and emotional development: consider the children's confident to tackle a problem.
- 2. Motivations of learning: adults need to consider if the child show adequate determination to stay with a problem, to think and to solve it.
- Cognitive development: adults have to consider whether the children have reached the cognitive capacity to perform logicality, sequencing, classifying and sorting categories of a particular event.
- 4. Linguistic development: adults shall concern the speech level of the children, that they might have limited vocabulary to describe their own plan and strategy on solving a problem.
- Creative development: adults shall concern whether children show imagination on a practical task.
- 6. Reflection responses: adults allow children to express children's wish to improve the task, find out the weaknesses, and quest for more explorations (pp. 3 4).

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#### 2.5 Higher Order Thinking Involved in Music Curriculum

In past, Schmalstieg (1974) identified that methodology in music education emphasizes the training of music specialists or music educators to accept new challenges in teaching music, and the invention of new ideas and curriculum allow the children to participate in the curriculum. Music curriculums that combine the disciplines mentioned above could recommend teachers to use new psychological methodologies in teaching approaches especially to elementary children.

Bamberger and Brody (1984) stated that music fact-making examples come from real world settings, not from experimental laboratory. Music thinking activities could be strategized with puzzling questions, concerning modes and languages for describing music objects, and musical relationships. These musical interactions internalized strategies in an individual in apprehending music objects and relations.

Davidson (1994) suggested that the design of the music classroom was crucial and very sensitive, where creativity and thinking skills are acceptable and encouraged under the appropriate learning situation. Students are also encouraged to ask musical questions, and solving musical problems in groups. Music teachers shall provide students something to "think", and memorize. Once students had developed musical thinking minds, they are certainly confident to approach new music later on (p. 15). Davidson (1994) also encouraged several thinking techniques in the music classroom: a) compare and contrast, b) finding ways to approach a task, c) decision making, d) creating a musical product, e) brainstorming, f) analyzing, g) Sequencing, h) synthesizing, and i) evaluation.

#### 2.6 Introduction to Sight Reading Skill

Sight-reading is the musical skill that being most concerned musical skill in music learning. Before the review of the relationship between higher order thinking skills and sight-reading skills, this section first reviewed the definitions and mechanisms involved in sight-reading.

# 2.6.1 Definition of Sight Reading

Sight-reading is described by the performer's strength to process highly complicated visual input such as musical notations on a score), without chances to correct the errors (Kopiez & Lee, 2006, p. 97). Therefore, sight-reading skill involves perception (decoding note patterns), kinesthetic (executing motor programs), memory (recognizing patterns), and problem-solving skills (improvising and guessing). (Lehmann & Arthur, 2002; Pike, 2012) However, not all sight-readers are having the same activity in mind during sight-reading performance (Lehmann & Arthur, 2002, p. 135). Lehmann and Kopiez (2009) pointed out the similarity of sight-reading and improvisation, as both skills required the instant adaptation to new constraints during the actions. Both are open skills that require well-rehearsed motions, but experiencing unexpected events within its context. Gudmundsdottir (2010) preferred the term "music reading" rather than "sight-reading" because it is more than its consideration of decoding note symbols using musical instrument (p. 331-332). Saxon (2009) stressed sight-reading is all about playing a piece with constantly looking-ahead eye movement.

Good sight-readers often able to retain more notes in visual trace (McPherson, 1994, p. 218). They were able to chunk larger musical patterns during the performance, and able to read further notes, associated with fine motor skills for the playing (Pike, 2012). Amateur sight-readers often focused on individual coding of notations (Lehmann & Arthur, 2002; McPherson, 1994, Pike, 2012). Saxon (2009) said that what makes a good sight-reader is how proficient the ability to constantly look forward is and never looking backwards during sight-reading (pp. 22 - 23).

Also, studies showed that pitch information and timing information are processed separately during sight-reading. These two types of information are perceived separately too (Palmer & Krumhansl, 1987; Schon & Besson 2002; Waters & Underwood, 1999). Gudmundsdottir (2010) said timing information is crucial because it moves the music forward (p. 335). However, accurate perception of timing, and accurate rhythm reading largely depends on the sight-reader's ability to construct and reproduce a temporal pattern, based on their mental capability (Palmer & Krumhansl, 1987).

A sight-reading performance and sight-reading outcome should be measured and investigated in terms of:

- 1. Accurate musical outcomes from what has been written on the music staff with standard notations.
- A person's music reading ability, which represents the competency of reading according to the person's reading level.
- 3. A person's first attempt to play unseen pieces (Udtaisuk, 2005, pp. 6-7).

#### 2.6.2 Overview of piano sight-reading methods

Since human's brain was made to perceive patterns, exercise with patterns became common practice strategy in most music lessons (Gordon; 2003; Pike, 2012). From past, *David Carr Glover Method for Piano Sight-Reading* and *Ear Training* published in 1989 promoted exercises based on first playing in specific patterns and gradually moving out from these patterns and recognition of intervals. Similarly, *Faber Piano Adventures* introduced four measures reading for beginners, and added with colorful arts to attract children' attention. *Alfred's Premier Piano Course* did included short sight-reading flashes, and short pattern recognition in prior for application of patterns in short tunes for children. In local, *Lina Ng's Piano Lessons Made Easy* was largely used for initial reading approach, as it introduced four measure, and note-by-note reading at middle-C position. Ng Ying Ying's Poco series on piano suggested middle-C position reading, but from the first line on treble staff that is "E" note and the top line on bass staff that is "A" note. In general, all these method books introduced regular practices from short pieces, and recognizing patterns to build up experience in chunking that improved execution of motor skills and eye-hand span.

Pike (2012) encouraged music teachers to create as much as possible, one or two measures of music reading drills for the students to practice reading in every week, so that the students could access to large-chunking drill library. Pike (2012) again, suggested music pattern flash that allowed students to view the two measures of music for a few seconds only, than execute their eye-hand span to the maximum, recall the music quickly and played the music with their memory.

Though merely practicing and pattern drills are the most direct ways in coaching sightreading, but it might not sufficiently train the music students to improve in reading both timing and pitch information of music scores. New pedagogy ideas shall be introduced to achieve optimum outcomes (Nesbitt-Hawes, 2005).

#### 2.6.3 Eye-hand movement – visual input of sight reading

One of the very concerned issues in sight-reading is the eye-hand movement ability, which the ability to perceive visual information would be discussed with higher order thinking skills later. Kopiez and Lehmann (2009) specified that eye-hand movement operated as medium to perceive reading information, and to execute it with hand movements on making sound upon the instrument (p. 345). However, Kopiez and Lehman (2009) stated that not all notes could be focused upon a sight-reading performance, thus it will be claimed as an incomplete visual input (p. 348). Penttinen (2013) demonstrated in recent researches about tracking eye-movement of inexperience sight-readers towards specific features of notation, patterns as melodic events, and metrical division, and their kinesthetic response during sight-reading. Thus, to improve eye-hand movement development on music reading, systematic of stimulus design and development of complementary methods on sight-reading are crucial. Hodges (1992) summarized that the basic research on music reading indicates that eye-movements and kinesthetic movements are influenced by the nature of the music being read.

#### 2.6.4 Chunking in sight reading

Since our brain operates similarly like a pattern-making system, we normally perceive things and objects in the form of seeing meaning of the object by a series of pattern, rather than the absolute entity of itself, as well as coding notations during music sight-reading (Gordon, 2003; Pike, 2012). Wristen (2005) suggested that if sight-readers recognize "chunks" of information, it follows logically that they would move the eye over a block of notation, which read a whole measure at a time, rather than sequentially looking at each note by note (p. 49). There are more supportive proofs that good sight-reading skills include a skillful chunking ability during sight-reading, with looking-forward eye-movements. Neither colored-coded notations, nor black-color notations, have any effect on enhancing the music reading skills (Rogers, 1991). Saxon (2009) defined chunk as: "A vocabulary of commonly occurring note groups that can be rapidly encoded and processed in reading." (p. 23). Saxon (2009) also encouraged chunking behavior while training sight-reading skills upon students, and also practicing with music that is accessible, and 'readable' by the students (Waters, Underwood and Finlay, 1997).

#### 2.6.5 The effect of chunking tonal patterns in sight-reading

Musical structure has always been crucial in stimulating a person's sight-reading ability of musical pieces, especially the effects of tonal pattern upon reading ability. It largely affects sight-readers' reading proficiency upon the musical notations (Grutzmacher, 1987). To become good sight-readers one must acquire perceptual pattern recognition skills, which the person could automatically defined it as common musical structures or events within the musical text (Wolf, 1976). Besides, more expert readers showed higher ability to recognize groups of musically meaningful "chunks" of notes more efficiently than less skilled sight-readers (Salis, 1980; Sloboda, 1978). This is because better sight-readers have a larger "dictionary" or tonal pattern vocabulary, which facilitates the processing of musical events during sight-reading (Sloboda, 1974, p. 241).

Wristen (2005) had concluded those expert sight-readers uses "chunk" methods that allow them to perceive multiple details in the score, simultaneously. Fluent sightreaders are often able to fit in more notes and score details into their perceptual spans. They exhibit better pattern recognition than novices, and they perform better when combining "chunks" of information into larger cognitive constructs. Expert sightreaders mark the structure of the music while sight-reading, whereas novice sightreaders tend to focus on the denoted part of the music score (p. 49)

#### 2.6.6 Conclusion of sight-reading skill

In short, sight-reading experience gained in the sense of when students were exposed towards more reading opportunities as mentioned. When it comes towards students ability to perceive timing and pitch, it was much clearer to witness their ability through how much pitch and timing information that they are able to perceive during the reading of the particular musical vocabulary or the tonal pattern.

#### 2.7 Higher Order Thinking Skills as Sight-reading Skills

Sight-reading is a "thinking collaboration" of many aspects – perception, kinesthetic, memory, and problem-solving skills (Lehmann & Arthur, 2002; Lehmann & Ericsson, 1993, 1996; Pike, 2012; Waters, Townsend, & Underwood, 1998).

Pike (2012) stated that perception, in this case, relates to cognitive learning and "chunking" of musical patterns on the score. '*Fovea*' is a small visual area in everyone that defines the ability of identifying small areas that is being focused during sight-reading, with visual cues. At the same time, when a person reads the excerpt, a larger area within the brain starts working which is known as the "*parafovea*" (p. 24). This is why a human brain is explained as being programmed to search for familiar patterns, or grouping objects, and recognizing familiar character objects or musical tunes. More experienced musicians are able to fill in gaps while performing sight-reading, because they would have more efficient "*fovea*" and "*parafovea*", working and intersecting each other (p. 24). "Chunking" becomes more natural if the student is being taught to deal in many aspects with the "chunk" of musical patterns. Thus, sight-reading becomes more successful because fewer gaps are created with "chunking" sight-reading than "absolute note" sight-reading (p. 24).

Kinesthetic refers to eye-hand span (Pike, 2012, p. 24). When there is a musical pattern to be decoded, eye-hand span only comes into consideration because it refers to how efficient a student's adeptness can cope with sequential reading within its task. Eye hand span does not serve any meaning to absolute reading (p. 24).

Memory links visual and kinesthetic together in sight-reading. Memory occurs while a musician reads the music score briefly, and they are able to recall the musical chunks and musical materials on the spot, and to perform it. At the same time, the musician is able to make meaning out of the musical patterns, or having enough experience with playing similar music that strengthens their performance, and is able to perform it confidently.

According to Wristen (2005), some cognitive and perceptual studies had proved that brain carries more processing works, and more thinking modes involved during music sight-reading. Studies had shown that there is multiple cognitive and perceptive processes engaged simultaneously when performers read music by sight (Grutzmacher, 1987; Waters, Townsend, & Underwood, 1998; Wolf, 1986). Sight-reading also required high demand of on-the-spot working memory associated with sight-reading ability (Humphreys, 2013; Kopiez and Lee, 2008, p. 43). Thus, these cognitive and perceptive abilities had to be exercised and promoted to a higher level (Eisner, 2002). Waters, Underwood, and Finlay (1997) explored the critical psychological processes that mediated the skill of music reading in this research. From a musical perspective, musical sight-reading represents the bind-together of a useful musical skill, and also numerous critical skills, in order to cope with the note reading itself. Gudmunsdottir (2010) summarized that music reading involved several simultaneous processes including the coding of visual information, inner hearing, motor-senses, and visual-motor integration, from a cognitive perspective.

Bennets brothers (2008) stated that neuroscience is the reason how music connects with brain. However, Bennet's brothers concluded that neuro-scientific research did show that the structure of brain could change, as a result of what kind of thoughts and thinking mechanisms being input to it. They explained how reading and learning could affect brain-thinking structure, and that it was dominated by neurons scattering all over the important thinking parts of our brain, which will cause a person to mimic a pattern seen or heard, or the brain will automatically create the same pattern to enact towards the "pattern" seen or heard previously or at that particular moment.

Whether a person sight-read music notations fluently or less skillful, it was significantly depends on the thinking ability. This is because good readers are able to perform more fluent musical outcomes lied on their ability to grasp more information while chunking musical patterns, and able to read further notes in the score (Lehmann & Arthur, 2002; McPherson, 1994). Less skillful readers are more attentive towards coding individual notes (Lehmann & Arthur, 2002; Wristen, 2005). Undeveloped sight-readers tend to have smaller eye-hand span, they could only chunk smaller amount of notes at one time, or even only a note at a time (Wristen, 2005). Also, better readers have specific kinesthetic skills to manipulate the instrument (Lehmann & Arthur, 2002; Pike, 2012). When better readers able to grasp more information during chunking, the more efficient for them to recall and to play the score (Lehmann & Arthur, 2002; Pike, 2012). In addition, better readers are able to make "educated guess" on the notes that they might not able to read at the moment of sight-reading (Pike, 2012).

## 2.7.1 Higher order thinking skills versus visual

There were more proves that chunking musical patterns were crucial to sight-reading performance because chunking dealt with perceiving patterns visually. It is human's nature of obtaining information visually more than 90% during learning and thinking

including music sight-reading (Jensen, 2001). Dickinson (2002) stated that brain's visual cortex is five times larger than auditory cortex. This might offer better and longer storage of long-term memory while absorbing information visually. In addition, the society offered challenging and heavy reading and writing for students' academic achievements. Thus, teacher often become "word" oriented, but overlook students nature ability of thinking with "pictures", rather than "words" (Dickinson, 2002; Schmidt, 2007). Also, Dickinson (2002) addressed that more than 40% human relying on visual learning style more than auditory style, and expressed their own feelings visually more than auditory way. Thus, visual style of learning appeared crucial towards majority of human.

In order to improve reading literacies, and engage in effective thinking activities, seeing and interpreting images are vital and unavoidable (Crowford et al. 2009, p.1). Visual cues shall be advanced in order to promote advance learning (Zwirn & Libresco, 2010). To analyze artistic ideas, take positions of ideas, examine the visual images, increasing visual world of learning appeared crucial. (Zwirn & Libresco, 2010, p. 30). Through interpreting visual cues, it enhances understanding, power of dominating, and thinking (Sandell, 2011; Beal, Bolick, & Martorella, 2009; Coufal & Coufal, 2002; Crawford et al., 2009; Manifold, 1995; Schmidt, 2007; Werner, 2002; Zwirn & Libresco, 2010).

Vitulli & Santoli (2013) stated that analysis of visual elements is a technique of thinking and organizing. It involved organizing of line, shape, space, texture, color, value, contrast, movement, pattern and unity of one visual images (p. 118). It is a skills of seeing images more deeply (p. 118). Teachers' responsibility is to explore the fundamentals of enhancing the visual skills, and interpreting them more thoughtfully with students' corporation (p. 118). Students shall be groomed to more aware of these elements, while engage towards the principles of it.

Understanding, producing and responding to visual cues encourages students to engage in thinking skills, as well as analysis, interpretation, reflection, and use of perspective, all of which are so valuable and necessary in the social studies (Kosky & Curtis, 2008; Crawford et al., 2009). Teacher's guidance is certainly crucial in providing advance visual learning as meaningful subjects towards the students' engagement (Barton, 2005; Desai, Hamlin, & Mattson, 2010; Schmidt, 2007).

Lehmann and Arthur (2002) stated the difference of a human's visual eye with camera's vision:

We know from vision and reading research that people do not perceive the world around them the way a camera would, namely, as a good introduction). Instead, our field of vision has a small area (fovea) where the objects are in focus and then a blurrier circle of peripheral vision (parafovea), which by means covers the entire field of vision. (p. 137)

Hence, pattern and tonal pattern reading dominated the nature of music reading and sight-reading (Hodges, 1992). Once a person performed music reading, eye movement executed the person's thinking and processing ability towards musical fragment and chunks, or units of musical patterns that being seen during sight-reading performance (Hodges, 1992, p. 1; Pike, 2012). This is due to human's brain perceived meanings by recognizing patterns (Gordon, 2003; Pike, 2012). Human interpenetrated basic units

(words, patterns) to form musical objects and relations that seem logic and correct to them. (Bamberger and Brody, 1974; Gordon, 2003; Hodges, 1992; Pike, 2012).

It was observed that students tend to focus on coding pitch information during sightreading, rather than timing information (Capodilupo, 1992; Gudmunstdottir, 2010). Children as young as 3-4 years old are able to learn and identify individual pitches but only a few and they were not able to code timing information simultaneously (Capodilupo, 1992; Drake and Palmer 2000; Gudmunsdottir, 2010; Tommis and Fazey, 1999). They are unable to apply any reading strategies or any relevant reading skills while sight-reading. The ability to perceive longer series of pitches increased in children aged between 4 - 10 years old, considering that all the treatment and instructions offered simultaneously towards them are similar (Capodilupo, 1992; Shehan, 1987).

In addition, as we react towards something or we mimic something, we store this "something" of the patterns into our long-term memory. The "something" could be a visual cue towards a musical sound, or a purely imagination of representation of the pattern being stored (Hodges, 1992, p. 279).

## 2.7.2 Higher order thinking skills versus chunking

The involvement of higher order thinking skills in sight-reading was again, explained by problem solving skills during the reading itself. Problem-solving during sightreading probably referred towards the coding of the chunks, which the ability to read by chunks is taken from a previous knowledge or experience that applies towards the sightreading task. Visual input functions as retrieval cues towards the chunk (familiar or less familiar to the particular musical event), and convert it to a known motor program (Kopiez and Lehmann, 2009, p. 348).

The reasons of good readers are able to perform more fluent musical outcomes lied on their ability to grasp more information while chunking musical patterns, and able to read further notes in the score (Lehmann & Arthur, 2002, p. 139; McPherson, 1994, p. 217). Less skillful readers are more attentive towards coding individual notes (Lehmann & Arthur, 2002, p. 139; Wristen, 2005, p. 49). Also, better readers have specific kinesthetic skills to manipulate the instrument (Lehmann & Arthur, 2002; Pike, 2012). When better readers able to grasp more information during chunking, the more efficient for them to recall and to play the score (Lehmann & Arthur, 2002; Pike, 2012, p. 25). In addition, better readers are able to make "educated guess" on the notes that they might not able to read at the moment of sight-reading (Pike, 2012). Thus, the thinking mode and capacity of individuals had largely affected their sight-reading achievement.

#### 2.7.3 Memory plays role in sight-reading

Short-term memory is the necessary short period of time to store an amount of information (Lee, 2003, p. 262). In sight-reading, the short-term memory function describes the ability to recall the number of pitches when the excerpt was taken away (p. 262). However, good sight-readers could recall up to 5 - 6 notes, while others are only able to recall a maximum of 1 - 3 notes (p. 262).

Truit et al. (1997) found that there is a possibility that forward reading with two more beats during sight-reading will lead to a slower tempo in playing and reading. Furneaux and Land (1999) found that average sight-readers could perform short memory of two beats, whereas more expert readers could process up to four beats. Sloboda (1977) investigated the meaningfulness of musical structure towards the memory process during sight-reading, and found the significance of it. Also, trials and errors in sightreading can foster the long-term memory in reading and later, by retrieving as much materials as they can for better reading the next time (Lehmann & Ericsson, 1993; Ericsson & Kintsch, 1995). More expert sight-readers are also able to code and store musical events in their short-term memory more efficiently (Clifton, 1986; Halpern & Bower, 1982; Sloboda, 1976; Thompson, 1987).

Kopiez and Lee (2006) proved that sight-reading achievement was explained and defined by the result of specific combinations of different categories of skills, which include the capacity of working memory during sight-reading (general cognitive skills), reaction time (elementary cognitive skills) towards reading and sight-playing, accumulated sight-reading experiences (expertise-related skills), and inner hearing. As the complexity of sight-reading tasks increased, these skills varied, especially expertise-related skills becoming more dominant when sight-reading complexity reaches its highest level. When the sight-reading tasks demands increased, there would be a 'bottleneck' in the speed of information processing. By then, the sight-reader has to rely largely on accumulated experience through regular sight-reading practices, in order to overcome the 'bottleneck' situation.

Humphreys (2013) stated that long-term memory is a good mental hook for storing different pattern of pitches for recalling later, especially during sight-reading and sight singing. Short-term memory depends on a person's ability to hold information in consciousness, for approximately plus or minus two (7+- 2) chunks of information

during sight-reading. Channel load was referred to a collection of pitches within a shortterm memory functions, but reflects disconnectedness from one another. When sightreading is practice with repetition of patterns and series of pitches as main approach, gestalt will form, and channel load would be reduced, thus pitches become more connected and smoothly performed.

# 2.7.4 Conclusion of higher order thinking skills in sight reading

After all, it was understood that there is a strong linkage between higher order thinking skills and sight-reading performance. Firstly, in terms of contribution of higher order thinking skills towards sight-reading performance, higher order skills was activated during sight-reading through the analysis of visual information that had being perceive by human's eye. This include solving technical problems of chunking the musical patterns between recognizing familiar and unfamiliar musical patterns, decoding pitch and timing simultaneously within the musical vocabularies, store musical information of musical vocabularies that has to be retrieved at any moment while sight-reading familiar or unfamiliar patterns.

Secondly, sight-reading achievement was dominated by students' mental capacity of coding timing and pitch information within the performance. Which means that sight-reading achievement of someone might proportionally portray the person's mental ability and mode of thinking. Thirdly, through the review above, it was concluded that the role and function of higher order thinking skills in teaching and learning of sight-reading skills was largely controlled by the methods that being applied towards the

sight-reading drills for the students, such as suggestions of reading drills with music tonal patterns, used of flashcards and many more.

In general, the methods are the medium of aiding the execution of higher order thinking skills into daily sight-reading practices. It was more accurate to specify that usage of higher order thinking skills were decided by nature of the tasks and lessons for the students.

## 2.8 Other Sight Reading Approaches

This section reviewed some other researches and perspectives about sight-reading improvement.

Gudmundsdottir (2010) thinks that the convention teaching method often did not foster the acceptable fluency in sight-reading performance for young musicians (p. 331). However, a good music performance skill does not mean a good performance and high competency in music sight-reading skills (Gudmunsdottir, 2010, p. 333).

For example, Fourie (2004) reports that 80% of errors in sight-reading are rhythmic in nature, probably caused by the difficulty related to locating the correct key on the keyboard. Bebeau (1982), Colley (1987), Palmer (1976), and Shehan (1987) concluded that the use of syllables, or related mnemonic devices, is an effective pedagogical approach for teaching music reading skills.

Dib and Sturmey (2011) used general-case training, instructions, rehearsals, and feedback to guide and to train 3 advance flute players, in order to improve their sight-reading skills. The results actually showed significant improvement with less sight-reading errors occurred on each subject in this research.

Lee's research in year 2004 investigated the complexity of sight-reading stimuli on sight-reading performances, and concluded that sight-reading skills must be nurtured before age 15. The high complexity of music stimuli could enhance the sight-reading ability of a young student.

Emond and Comeau (2012) compared the difficulties in different piano beginner methods – intervallic and middle C, which could have caused different improvement towards sight-reading performance. Through cognitive modeling, the study showed that the "more explorative" nature of intervallic method can promoted more maturity in sight reading development, due to its nature of forcing students to work more on gesture planning while playing a tune. Whereas middle C method was a safe method which students are more relaxed in gesture planning. However, while sight reading intervallic pieces would have produced more chances of sight reading gaps and chunks than that of middle C position due to its difficulty and interval exploration, this showed that less errors (less exploration) could have led to slower note reading development than that of intervallic method.

In addition, when one student visually scans the music notes on the score, the student is also scanning the piano keyboard to play the keys. The student's motor skills functioned as he or she move fingers over piano keys as it involved pressing the keys, holding and releasing the keys, and at the same time, think and process instructions from a piano

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tutor at the same moment of learning piano (p. 45). The visual encoding of the notes on staves and the keyboard involved students' cognitive and mental process that binds together the notation information – staff, vertical location, duration, number of beats, declaring which fingers to be used, recognizing three-black group or two-black group type, color of key to be pressed, and the knowledge about the clefs, functions of line and space of the staff, sound which represents the corresponding note on the piano keyboard and so on (p. 45).

Also, Emond and Comeau (2012) stated that the intervallic approach demands more motor planning compared to the middle-C approach (p. 46). But according to Emond and Comeau's (2012) findings, when students are used to the extra demands of motor planning, there will be a consistency of time spent on building an execution plan while coping with the reading of the passages (p. 47). Whereas middle-C approach introduces that safe learning can cause an inconsistency on the time spent on building execution plans while sight-reading the pieces, students might take longer hours trying to perceive the meaning of fixing their finger positions on the piano keys in order to play the pieces, compared with intervallic approach on piano learning (p. 47).

# 2.9 Summary

This literature review has discussed thoroughly about the relationships of higher order thinking skills involved with the visual base and cognitive base of music sight-reading upon standard notations. Sight-reading skill is strongly connected to mental works, and the strong stimulating effect of tonal pattern chunking acted towards the expertise of sight-reading. However, children's mind progresses are totally different from an adult's,
and with the appropriate and relevant curriculum design, educators will be able to connect with and understand the children's thinking mind and design appropriate sightreading curriculum for the piano beginners. Through this literature review, it was discovered that there are not many recent researches done on the effectiveness of higher order thinking skills towards sight-reading. For further information, Chapter three discussed about the methodology of this study.

# **CHAPTER 3: METHODOLOGY**

### 3.1 Overview of Methodology

This chapter presented the methodology of this research. It was being discussed as the following sections:

- 1. Research Methodology
- 2. Fieldwork procedure
- 3. Description of Participants
- 4. Review of the lessons and sight-reading test.

This qualitative research was conducted in the form of collective case study by observing and analyzing on four subjects who participated in the higher order thinking skills sight-reading lessons. The research addressed the research questions as below:

- Did the students committed and manipulated the lesson instructions well, as priority of further participation of the sight-reading lessons with higher order thinking skills?
- 2. What is the contribution of higher order thinking skills towards sight-reading of standard notations, in terms of absorption of sight-reading experience through instructions associated with higher order thinking skills being applied to the

practicing of reading pitch and timing upon the musical tunes and tonal patterns in each lesson?

- 3. How does the students' sight reading ability being influenced, by comparing their sight reading ability before participate the lessons and after the lessons, in terms of pitch reading, timing interpretation, and fluency of playing?
- 4. What is the role and function of higher order thinking skills in teaching and learning during the sight-reading lessons?

# **3.2 Research Methodology**

First and foremost, this qualitative case study involved four piano beginners within aged 7 to 10 years old, and had joined piano lessons not more than one year. They were selected from different music schools in Kuala Lumpur area, with the principal's consent, to conduct the teachings and recordings on each of them by researcher. Researcher recorded the students' first attempt of sight-reading with provided tunes at first week. The following week, researcher conducted all teaching of five sight-reading lessons for each of the subjects, each for a week for five separated weeks, and another first attempt of sight-reading with same tunes at the seventh week. The data were collected through the observation of the videos by researcher and another two experience piano teachers of all seven-week lessons for four subjects. Data collection was started from middle of June 2013 until end of October 2013.

#### 3.2.1 Research design

A case study research measures the conducting of a task under a situation or a phenomena; it could be empirical or experimental, which involved the findings of "real problems" that the happenings and person within the situation itself that able to be observed (Case Studies: Research Methods, 2010, p.1). Besides, the word "case" referred to a unit of human activity rooted within the "real problem" (p. 1). Case study was mainly conducted qualitatively, and the qualitative data was proved to be powerful and sophisticated towards the society (Travers, 2001, p. 13). In this study, researcher chooses to conduct the research with collective case study method.

This collective case study research involved four subjects who are sharing the similar background in piano learning. In collective case study, a mutual set of research questions were developed to take close approach to each individual as a case (Mills, Durepos, & Wiebe, 2010, p. 163). Besides, each subject was observed in depth individually, and each subjects' character and sight-reading ability would not being compared within each other, but the data obtained from each subject shall contributed to the mutual concept of the study (Mills, Durepos, & Wiebe, 2010, p. 163). In this study, all four piano students were observed in depth individually, in terms the function of higher order thinking skills towards their sight-reading improvement, and their improvement of sight-reading ability after their participation in the sight-reading lessons.

Researcher chose to do case study research with collective method based on the research questions, mainly because of the reasons as below:

- When doing a collective case study, the minimum number of participants to be observed is n = 3, and it is adequate when different dimensions of observation were appointed towards these participants (Mills, Durepos, & Wiebe, 2010; Graham, 2011). Since this study appointed a few observation dimensions upon four participants, the deep analysis of the findings were adequately contributed to the whole purpose of this research.
- 2. Based on the research questions, collecting numerical data might not valid and powerful as observation through the students's responses towards the sight-reading lessons. The role and functions of higher order thinking skills shall be evaluated through the observation of the lesson progressions, but numerical data would merely showing the effectiveness of the lessons, which researcher was more intended to seek the strength of applying the skills towards the sight-reading lessons.
- 3. As mentioned in chapter one, plentiful of scientific and technical researches on piano sight-reading improvement had done over years. Nevertheless, the research of the process of grooming sight-reading ability in classroom shall be weighed in order to investigate how piano beginners read musical notations. Young piano beginners often faced a hardship of comprehending the meaning of playing piano fluently and accurately at the beginning stage of learning. Hence, it was being prejudicial to measure exact accuracy on their playing with scientific approach; observation of their progress on their sight-reading ability shall be more highlighted.
- 4. Also, observation and pictorial explanation could lead to deeper analyses of students' performance aspects, which are necessary for better lesson design. By focusing towards small amount of students with thorough observation might not

assisting in looking into the students' sight-reading mind, but it could had contributed towards the discussion of different situations occur when the higher order thinking skills were applied into the sight reading lessons, which is the core concept of this research to observe the students' improvement through time.

### 3.2.2 Observation

In this case study research, researcher observed the participants' lessons through video recordings. Researcher chose to be a character that involved in the observation because it was one type of method to be able to get the students to respond to the lessons (Gillham, 2000, p. 46). Most importantly, researcher identified herself as a piano teacher before conducting piano activities to each participant in the early of the lessons, and not bias to each participant by not expecting them to responded researcher promptly (Gillham, 2000; Mills, Durepos, & Wiebe, 2010). As long as the existence of researcher as one of the character in the observation involved only the intention to obtain the students response towards the sight-reading lessons, the students' behavior would still considered as natural behavior that did not affected by external factors in overall (Gerring & McDermott, 2007).

Gillham (2000) stated that observation simply means watching and listening what people do and say at the moment:

The overpowering validity of observation is that it is the most direct way of obtaining data. It is not what people have written on the topic (what they intend to do, or should do). It is not what they say they do. It is what they actually do (which may also be reflected to some extent in records). (p. 46)

In this research, the strengths of gathering the data through observation rather than obtaining data of pitch accuracy and timing accuracy are as below:

- 1. Observation was the most direct way to obtain data (Gillham, 2000, p. 46).
- 2. The lessons were all video recorded. Observing through video was providing great help because it can be repeated for numerous times for review, and more aspect could be seen in each time of the review (Gillham, 2000, p. 49). However, the bias of the observation could be solved by observing the video with more than two experts, in order for the data to be valid and trustable (Gillham, 2000, p. 49).
- 3. In depth observation make sure one particular participant was being explored through a variety of dimensions, which allowed multiple derivations and possible outcomes being revealed through research (Baxter & Jack, 2008; Graham, 2011)

In general, gathering data through observation allowed researcher to fulfill the purpose addressed through the research questions deeply. Whereas quantitative approach only allowed researcher to obtain numerical data that showed effectiveness and improvement of sight-reading which were doubted to be fair enough, based on the piano beginners' immature sight-reading techniques. Although observation and analysis was time consuming, but it was the finest way for researcher to derive the pathway for analysis, which would be discussed further in below.

#### **3.3 Field Work**

The following presented the procedures of the fieldwork that being conducted for this case study research. The overview of the procedures of fieldwork were: 1) pre-field work: pilot study, 2) field work: data collection, and 3) after fieldwork – data analysis.

# 3.3.1 Pilot study

It was necessary to perform pilot study for a case study which being called as a "rehearsal" for the case study (Atkins & Sampson, 2002, p. 105). The strength of pilot study was to refine the research instruments such as methods to be applied, questionnaires, and also observation schedules and observation methods (Sampson, 2004, p. 383). According to Atkins & Sampson (2002), the purpose of pilot study were as below:

- 1. To determine the approach of the research, whether qualitative or quantitative
- 2. To determine the appropriate usage of the theory to be applied in the research
- 3. To reconfirm the purpose of the research
- 4. To refine the case study research questions
- To refine the methods or questionnaires, or other research instruments to be used in the research

- 6. To determine the criteria of selection of participants
- 7. To determine the systematic way to analyze data

By fulfilling the purpose of investigating the role and contribution of higher order thinking skills towards sight-reading performance for piano beginners, researcher did pilot studies on applying different thinking techniques that were logical towards the sight-reading practices of middle C position notes, for other piano beginners at different music schools. Afterwards, with the refined five lesson plans, researcher had conducted a pilot study of all five sight-reading lessons towards other piano beginners at ages 7 to 10. The purposes of conducting pilot study in its prior before conducting the research towards the main subjects was as below:

- 1. To finalize the five lessons whose contain the practice if the higher order thinking skills into sight-reading, which serves as the key research instrument in this study.
- 2. To obtain the practicability of application of higher order thinking skills with the regarding techniques towards the sight-reading lesson plan.
- 3. To observe whether the higher order thinking skill lesson plans were comprehensible by the piano beginners at ages 7 to 10.
- 4. To structure the objectives of learning in each lesson.
- 5. To determine appropriate sight-reading lesson contents by figuring out tonal patterns and tunes that are suitable for sight-reading improvement by practicing the

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tunes with higher order thinking skills and the regarding techniques that execute the thinking skills in each lesson.

- 6. To determine the "observable" traits that could be observed through their participation of the lessons their commitment of the lesson, the role of the higher order thinking skills when students were manipulating the lesson materials, the contribution of the skills towards their reading through the lesson, and their sight-reading improvement in terms of increasing confidence and alertness towards pitch and timing reading.
- To justify the suitable tunes as sight-reading pre and post test items according to the lesson contents, based on the purpose of observing the students sight-reading improvement before and after lessons.

Not all techniques were comprehensible for most students, some students find it complicated and struggling during pilot study of applying those thinking tactics in their sight-reading lessons. However, by filtering the most logical and suitable techniques that could lead to improvement, the higher order thinking skills with techniques applied in each lesson in this research, by sequence, would be discussed in further below. In overall, the findings of pilot study showed that the sight-reading lesson plans with applications of higher order thinking skills were practical and understandable for the piano beginners at ages 7 to 10.

#### 3.3.2 In fieldwork

There were plenty of private music schools located in Kuala Lumpur area. Researcher had visited a few private music schools and interviewed the school principals. Researcher was allowed to choose any particular participants among school principals' recommended students after observing their piano lessons with their own piano teachers, including interviewing their piano teachers regarding the students' previous piano learning progress. After four students was selected for the participation of the research, researcher set the schedule of conducting lessons with each of them for seven consecutive weeks, and conducted the lessons by following the schedule of the lessons

#### 3.3.2.1 Procedure of teaching and observations

The higher order thinking skills provided students with techniques that fluctuate and modify the tonal patterns through several ways, which alternated the visual indications on the tunes from its original pattern. Each student has to practice the tonal patterns under an obligatory condition of modifying the tonal patterns in standard notation form. The four students had undergone two sight-reading performance examination, each before and after the five treatment lessons, all within the middle-C position on the keyboard. The details of procedures are being enclosed upon Appendix F towards P at the end of this paper. Thus, the whole participation period for the students were seven-weeks in total.

#### 3.3.3 Data collection

Principals allowed video recordings in the classroom, but they strongly requested that recording device should be placed at a spot that the child is not aware of it or not to be alerted by its existence. Principals do wish that the videos did not exposed to third party as well. Students came for lessons every week during their normal lesson time, with the same piano room, but participating the sight-reading practices conducted by researcher. Thus, researcher had recorded a total of 28 videos from all four piano beginners.

#### 3.3.4 Data analysis

As mentioned, data analysis was organized due to what had been seen, heard, and read, through each of the video observations of students' sight-reading performances in both first week and seventh week, as well as all five lessons from the second week until the sixth week.

#### **3.3.4.1** Triangulation of data analysis

Triangulation of analysis in case study was being defined as positioning the balance and basis of the knowledge, conclusion and also distance between two or more opinions (Gillham, 2000; Mills, Durepos, & Wiebe, 2010). It is a measuring method of the description data that to reduce bias and improve validity of the data according to the case study (p. 944).

In questioning the bias and accuracy of information analyzed after each video observation, researcher invited another two experienced piano instructors as research evaluators, to evaluate all videos together, which is one of the triangulation method to improve validity of data (Gillham, 2000; Mills, Durepos, & Wiebe, 2010). Researcher explained the research purposes to them before evaluating the video together. Based on the research criteria, the order of reviewing the videos by all three evaluators of all four students were as below:

- 1. All four students' first attempt of sight-reading performance: in order to evaluate their sight-reading ability before participating in the five lessons.
- First lesson conducted with all four students: in order to evaluate the students' participation in the lesson, and the function of higher order thinking skills in stimulating the students' reading ability in the first lesson.
- 3. Second lesson conducted with all four students: in order to evaluate the students' participation in the lesson, and the function of higher order thinking skills in stimulating the students' reading ability in the second lesson.
- 4. Similarly, the same procedure applied towards the subsequent lessons, in order to evaluate the students' progress in sight-reading ability, manipulation of the higher order thinking skills and also their commitment in the classroom.
- 5. Lastly, the evaluators review the video of students sight-reading ability test after the students had participated in all five lessons, in order to evaluate their improvement

and gain in sight-reading ability after the whole period of participating the sightreading lessons.

After reviewing each video, three evaluators written down their ideas and opinions on paper. Researcher gathered all the ideas and opinions, and encouraged all evaluators to discuss about the exactness and appropriateness of the opinions of the observation, and make up the description upon the observation of the videos, and all evaluators had agreed the description contents of the videos. Researcher translated the lesson conversations and progresses into field notes with conversations and interactions between researcher and the students. The field notes shall be retrieved and arranged into the analyses according to the aspects of findings of the research questions later.

In overall, researcher and evaluators spent nearly six months for the whole process of observation, discussion and evaluation of the videos. The aspects and criteria of observation shall be discussed further in Chapter 4.

# **3.4 Participants**

The main criteria before the participants' engagement to the research was they must be volunteer or being appointed to participate. They must be willing to commit to the participation, and possess a spirit of involvement (Mills, Durepos, & Wiebe, 2010). The criteria of the participants shall be depending fully on the research questions addressed in the research earlier (p. 906). Thus, researcher shall set the criteria of selecting participants that may be expected to give results; whether positive, or negative, or null results according to the research questions.

The research data obtained from four participants in this research was being gathered through a few aspects – their participation and commitment in the lessons, their involvement and response towards the higher order thinking skills in the lessons, the influence of higher order thinking skills towards their sight-reading ability, and their sight-reading ability before and after their involvement in the lessons. As Graham (2011) had specified that N = 1 research involves multiple observations of only a participants over time was strongly effective and ideal as an individual research. The power of the research lies on the multiple observations concentrating fully on a small amount of subjects in detail manner. Thus, data gathered from four participants in this research was sufficient to fulfill the purpose of the research.

### 3.4.1 Criteria of selecting participants

Based on the research questions addressed above, the students that participate in this research shall fulfill the criteria below:

- Piano beginners who have joined piano lessons for six to twelve months time: only students who had already obtained basic training in playing and reading notes were selected.
- 2. Able to read standard notations within middle-C position on piano keyboard, able to perceive beat value including crotchet, minim, dotted minim, semibreve, and crotchet rest: this is very important because the lesson contents given are only within middle C range. Students who had piano training from six to twelve months would generally able to read notes within middle C range.

- 3. Average sight-reading ability: if the students were too poor in reading, the higher order thinking skills and techniques adapted into the lesson has been over-challenging to the child because the students had not achieve the level to perform critical and problem solving thinking towards the tonal patterns and tunes yet; if students were too experience in reading, than reading notations within middle-C position shall not fazed them, because they might no need higher order thinking skills to improve their reading ability at this level.
- 4. Within seven to ten years old, regardless gender: the ability of sight-reading and commitment of lessons did not significantly being influenced by gender, but students at age seven to ten were normally experiencing pre-mature stage that was ready to absorb new knowledge, as mentioned in chapter 2.
- 5. Within Kuala Lumpur area: easy accessible by researcher.

Researcher had an in-depth discussion with the students' piano teacher about the students' playing ability and behavior in classroom. Researcher was allowed to select suitable students under the school principals' permission, after seeing the students sight-reading ability, without students' noticing of someone was watching them during the lesson from outside the classroom. Researcher did not compare the students with regards to their sight-reading performance and comprehension of the lessons, according to their age difference – since age is not a factor of their maturity in their performance of thinking and reading (Lai, 2011, p. 23).

### 3.4.2 Description of primary participants

The four children who participated in this case study consist of two female and two male piano beginner students aged between 7 - 10 years old. The reason of choosing this four piano beginners among others were mainly:

- As mentioned, researcher was allowed to observe the students behavior during their regular piano lessons. They were performing average in behavior and their sightreading ability.
- 2. All students fulfill the criteria of participation as mentioned above.
- 3. The students were willing to join the participations, as well as their parents agreed upon their participation to the research for seven weeks.

Thus, the four students being selected for this research were: a) Angeline, 7 years old, from Cheras, Kuala Lumpur, b) Afiq, 8 years old, from Sungai Long, Kuala Lumpur, c) Loke Shin Yi, 9 years old, from Sri Petaling, Kuala Lumpur, d) Mitilan, 10 years old, from Pandan Indah, Kuala Lumpur.

# 3.4.2.1 Angeline

Miss Joanne, the music school principal, gave her permission to participate in the research after researcher proposed to her about the research. She fully supported researcher and offered her assistance if researcher needed any. Researcher chose Angeline from Joanne's music school as one of the participant. She had completed learning a few piano method books including Lina Ng's Piano Lesson Level One and a few other supplement method books on finger studies. Angeline as an obedient girl, and she was very focused on piano learning. Researcher was allowed to observe her progress during her piano lesson, before she took part in the research. She was a very careful and slow paced pianist, listening to the teacher's instruction patiently. She reads and plays the notes very slowly, but accurately. Researcher made appointments for lessons with her where her first lesson was on Monday, 8pm, and the subsequent lessons on every Saturday, 9am.

# 3.4.2.2 Afiq

Lynn is a friendly and kind piano teacher who has agreed to let researcher observed a few of her piano beginners piano lesson in order to choose the suitable one for the research. Lynn teaches those students in a music school too. Researcher contacted the music school principal through email as the school principal was away for a couple of days. After a few days, researcher received the principal's permission to teach Afiq in the music school. Afiq behaves well during his piano lessons and he is a fast learner. Afiq has just completed learning the first book of the Alfred series piano method books for piano beginners. He was proceeding to the second level of the same series under Miss Lynn's guidance. As researcher observed his progress during his piano lesson with Lynn, he was very obedient, and a competent sight-reader for middle-C position notes and fingerings. As agreed, researcher would meet him for lessons on every Monday, 11 am.

#### 3.4.2 3 Loke Shin Yi

Mrs Lim patiently listened to researcher's purpose and research plans, including researcher's intention to conduct teaching and observations with the piano students in the music school, for a couple of weeks. She asked researcher to contact her school piano teacher, Stella, directly. Stella was very glad to offer help. Stella recommended a smart girl, Shin Yi, to researcher. But she was behaving a little naughty at times. When researcher observed her piano lessons with Stella, she started to play some tunes from her piano books. It was overall correct, but with no sense of timing. Therefore, it sounded like she played with all crotchet beats. Researcher agreed to coach her for a few weeks and the lesson was set to be every Thursday, 4 pm. Loke Shin Yi has also completed Lina Ng's Piano Lesson Level One, as well as John Thompson's Piano Lesson Book One and Book Two under Miss Stella's tutelage. She is proceeding to John W. Schaum's series of method books.

#### **3.4.2.4** Mitilan

When researcher proposed the research purpose to Miss Aw, she was delighted, hoping that researcher can help one of her beginner student, Mitilan. Miss Aw told me that Mitilan was a really weak sight-reader, and he was often confused with note reading. She asked researcher to be patient while teaching Mitilan. Mitilan's piano lesson was often conducted at Miss Aw's rented condominium, which was furnished for her piano classes. Fortunately, she said that he was improving a little in his reading ability lately; reading middle-C notes should not be a great challenge for Mitilan. Researcher agreed to help Mitilan, and the lesson was set to be 12pm every Saturday, at Miss Aw's own condominium. Mitilan had joined piano lessons under Miss Aw for approximately eight months. Miss Aw trained his reading ability from basic by using Lina Ng's Piano Lesson Level One, and later, with John Thompson's Book One and Book Two.

### 3.4.3 Secondary participants

The students' and regarding piano teachers' name and profile will not be mentioned in this research as agreed. The names mentioned in this document are nicknames representing their identity in this observation. All students' profile that had mentioned above were obtained by interviewing regarding piano teachers of the students. The purpose of interviewing the regarding piano teachers were to determine the selection of the students, and to get to know more details about the selected participants' sightreading ability. The questions of interviewed were categorized as below:

- Student's personal profile: age, musical background and how long they have been learning piano lesson under the same teacher.
- Student's reading level: their mastery of middle-C position in piano playing, current method books used during lesson, their behavior and attitude, and the teacher's comment towards their learning ability.
- 3. Student's attitude and behavior: the student's attitude during piano lessons, and how interested they were towards piano learning.

### 3.5 Review of Lessons

Since the lessons were being the main research instrument that involved participation of four piano students, and the findings were fully based on the progress of the lessons, the following presented the details of each lesson that being conducted by researcher for four students, seven-weeks for each student.

# 3.5.1 Objective of the lessons

From pilot study, the suitable higher order thinking skills that are viable and logical to be applied into sight-reading lessons being modified into a five-week lesson plans. The main objectives of the lessons are:

- 1. In order to expose students with variety higher order thinking techniques of gaining sight-reading experiences.
- In order to expand students' thinking ability to cope more complex sight-reading materials.
- 3. In order to encourage and motivate students to sight-read new materials more confidently and skillfully.
- 4. In order to improve their proficiency of interpreting pitch and rhythm during sightreading through variety of sight-reading experiences.

5. Allowing students to increase opportunity in reading more music vocabularies.

# 3.5.2 Thinking skills involved of each lessons

Table 3.1 enclosed the thinking skills involved in each lesson, which derived from Bloom's Taxonomy, Marzano's Taxonomy, and Integrated Thinking Model:

Lesson	Lesson Title	Lower Order Thinking Skills Involved	Higher Order Thinking Skills Involved
One	Exchange	Understand, Apply,	Analyze, Evaluate
Two	Substitute	Understand, apply, Identify	Critical thinking, Make decision, Problem solving
Three	Memory	Apply, Remember, Recall, Retrieve	Coordinate, Problem solving
Four	Compare	Identify, Compare	Differentiate, Problem Solving
Five	Synchronize	Understand, Identify	Synchronize, Coordinate, Combine

Table 3.1: Thinking skills involved in each lesson

Each lesson contained different lesson materials, and different higher order thinking skills instructions being utilized into the lesson. As being discussed in literature review, lower order skills are the ground for higher order thinking skills, and all skills could be introduced in bridging order.

### 3.5.3 Materials in each lesson and sight-reading sessions

After pilot study, researcher had arranged the lessons with suitable tonal patterns and tunes, as well as with the suitable amount of tonal patterns provided according to the higher order thinking skills involved in each lesson. The details of materials and sight-reading excerpts could be referred in Appendices. In addition, all tonal pattern flashcards and paper sheets printed with tonal patterns are in the standard notation form. There are three treble clef excerpts, three bass clef excerpts and one hands together excerpt, thus each treble clef excerpt named as T1, T2, T3, each bass clef excerpt named as B1, B2, B3, and hands together excerpt as TB1. Appendix E showed the detail descriptions of the materials used in each lesson.

## 3.5.4 Designation of sight-reading pretest and posttest content

Although sight-reading means the ability to play the music at first attempt, but sightreading also applied towards music that had read in the past time (Maydwell, 2007, p. 2). Unless the music was being studied in details over a long period, it is very difficult of someone to retain the information of the music even though it had been sight-reading in the past time (p. 2). Hence, the items in pretest and posttest were identical, regarding the first week and the seventh week of sight-reading tests for the students, Addressing the identical items in the posttest was directly looked into the improvement of students' sight-reading performance after a five-week of sight-reading lessons participations. The arrangement of the tunes in the sight-reading items were based on the tonal patterns that had been practiced in their sight-reading lessons within five weeks (Refer to Appendix Q and R).

# 3.5.5 Procedure of the teachings of each lesson

As mentioned, each student participated in this research for a period of seven week; this included a sight-reading pretest and posttest of sight-reading performance. All lessons and sight-reading test would be recorded as mentioned. The detailed instructions shall be referred from Appendix F towards Appendix O. The following reviewed each lesson procedures in detail:

- First week: Students were given one minute to look through 3 treble clef excerpts and sight-play them; followed by one minute to look through 3 bass clef excerpts, and sight-play them; lastly with one and half minute to look through a hands together excerpt, and sight-play them afterwards.
- 2. Second week: The first lesson started with 10 tonal patterns in the lesson. Researcher demonstrated the instructions of how to manipulate the tonal pattern flashcards and other materials related to the lesson, with the first tonal pattern. Than students proceeded with the instruction with the rest of the tonal patterns. Finally, researcher requested students to revise all tonal patterns again.

- Third week until the sixth week: Third week would be the second lesson being conducted by the researcher with each student. The procedures went on the same as with the first lesson.
- 4. Seventh week: This is the final week, which all lessons had done. The students were being tested to sight-read the same tunes but they would not being reminded so. The procedure of the test was same as the first week.

### 3.5.6 Duration of each lesson

Each lesson includes solving a fixed amount of tonal patterns or musical tunes, involving a final revision of all tonal patterns being practiced and solved during that particular lesson. Due to the difference of procedures taken in each lesson and the fixed amount of tonal patterns to be solved in each lesson, the duration per lesson varies according to the lesson's content as shown in Table 3.2.

The procedures of solving each tonal pattern in lesson one, lesson two and lesson five were slightly time-consuming, including the revisions of all tonal patterns at the end of the lesson. Thus, students spent slightly longer time on solving a particular pattern before moving on to the next pattern. The duration of lesson three and lesson four is shorter as compared to other lessons, due to its nature of procedures that were less time consuming. The amount of tonal pattern and musical tunes offered to the students in all these lessons were adequate for their comprehensiveness of the lesson. Too much tonal pattern solving could result in impatience, tiredness, and lost of attention during the lesson.

Lesson	Lesson content	Expected Duration (min)
$1^{st}$	Five 4-beat tonal patterns in treble clef. Five 4-beat tonal patterns in bass clef	20
$2^{nd}$	Five 4-beat tonal patterns in treble clef. Five 4-beat tonal patterns in bass clef.	25
3 <sup>rd</sup>	Two 4-beat tonal patterns each in treble and bass clef. Two 4-beat musical tunes in 2-measure, each in treble and bass clef.	10
4 <sup>th</sup>	Two 4-beat tonal patterns in treble clef. Two 4-beat tonal patterns in bass clef. Two 4-beat musical tunes in 2-measure, treble clef. Two 4-beat musical tunes in 2-measure, bass clef.	10
5 <sup>th</sup>	Three 4-beat musical tunes in 4-measure. Hands together.	25

**Table 3.2:** Lesson content and expected duration of each sight-reading practice lesson.

Table 3.3 shows the time spent on each lesson, which varies slightly from the expected duration, according to each student's individual attitudes and behavior in the classroom. Overall, the duration of each lesson for one student to complete a particular activity with a fixed number of tonal patters is as below:

Students	1 <sup>st</sup> lesson (min)	2 <sup>nd</sup> lesson (min)	3 <sup>rd</sup> lesson (min)	4 <sup>th</sup> lesson (min)	5 <sup>th</sup> lesson (min)
Angeline	20	25	11	11	28
Afiq	15	25	9	10	21
Loke	16	23	10	9	24
Mitilan	15	21	10	10	18

Table 3.3: Duration of each lesson of each student to complete the activities

# 3.6 Summary

Chapter three presents the methodology of this research, which is a collective case study about four children who are young beginner pianists and their participation of practicing sight-reading with higher order thinking skills in five lessons, as well as their sightreading performance development overall. Three evaluators describe the situation of the whole period of participation, by observing the students' performance in each lesson qualitatively. Furthermore in chapter four, with description form, researcher accustomed a discussion of applying thinking skills as learning approach in sight-reading practices, by examining each of the students' progress, and how sight-reading performances were being affected after the lesson period.

### **CHAPTER 4: ANALYSIS OF DATA AND FINDINGS**

#### 4.1 Analysis Reading Guides

This chapter presents the analysis of findings in description form, and being arranged according to the research question addressed in chapter one. Hereby researcher had highlighted the guides of reading the analysis as below:

- In the analysis, researcher mentioned the regarding tonal pattern and tunes in letter names. E.g. "CDEG" (treble) represents a 4-beat tonal pattern, with each letter name as a crotchet beat, and those were treble notes on the middle-C position. CrEr, G - E, represents a two measures short tune in 4/4 time, "r" represents crotchet rest, "G - " represents the note G was in dotted minim beat.
- 2. The instructions of each lesson would be briefly included in the analysis. However, the details of the instruction of each lesson shall be referred in Appendixes.
- 3. When the analysis mentioned about "Evaluators", it was representing three person together, which researcher and another two evaluators. The analyses at below were all final descriptions being compiled by researcher based on the conclusions made by three evaluators during observation and discussions of all the lesson videos.

The following enclosed the brief description of the instructions in each lesson:

- Lesson one: All 4-beat tonal patterns given to the students had to be split into half and being exchanged, aid by tonal pattern flashcards. Students had to practice the tonal patterns before and after exchanged.
- Lesson two: Any one or two pitch from a 4-beat tonal pattern must be substituted by another one/two different pitch(es) provided, than the new tonal pattern had to be identified again among a few similar tonal patterns. Students practiced the patterns after substitution.
- 3. Lesson three: After memorizing a short tune, students had to rearrange it with a few flashcards in random order by memory. Students practiced the tunes after the arrangement.
- 4. Lesson four: Students had to identify a pitch difference between two similar tunes, and sight-read both tunes correctly.
- 5. Lesson five: With pitches series and rhythmic patterns, students shall synchronize both elements in making up one short tune; by arranging the regarding magnetic notes on the white board drew with a grand staff. Students practiced all tunes after synchronization.

#### 4.2 Students Commitment and Manipulation in the Lessons

According to research question one, did the students committed and manipulated the lesson instructions well, as priority of further participation of the sight-reading lessons with higher order thinking skills?

As mentioned, commitment in learning is the priority of absorbing knowledge, although students were not yet predicting the purpose of engaging deeper into the learning (Butterworth & Twaites, 2013). Besides, learners must be able to commit towards perceiving facts and memorize units of learning (Mardigian, 2011, p.2). In order to be promoted to higher order skills in a learning situation, there must be considerable manipulation skills ranging from lower order skills, in order to be able to present facts and operate the ideas (Abeles, 1994; Eisner, 2000; Munzenmaier & Rubin, 2013; Butterworth & Thwaites, 2013). Hence, students' commitment and manipulation were explained by the engagement with lower order thinking skills in each lesson. To look into lower order thinking skills were significant, because they are the prerequisite skills in order for students prepare to participate in higher order thinking skills activities.

In this research, the criteria of measuring students' commitment and manipulation of the lessons were largely related to the lower order thinking skills in each lesson involving Bloom's Taxonomy, Marzano's Taxonomy, and Integrated Thinking Model. Students' commitment towards lessons and manipulation of the tasks would be enclosed with interactions with researcher during the lessons, in the form of description and conversations, especially during the first demonstration by researcher in the beginning of each of the lessons.

### 4.2.1 Commitment observation criteria

The criteria of observing and measuring students' commitment in all the sight-reading lessons were due to each student's ability to pay attention and cooperate with listening researcher's first demonstration of the instructions of each lesson, and also their ability to comprehend instructions. Lower order thinking skills being observed were involved:

- 1. Understand: ability to comprehend instruction of each lesson
- 2. Identify: ability to recognize rhythmic patterns and pitch series

# 4.2.1.2 Commitment observation

The following presented the observation of commitment of each student into the five sight-reading lessons in order.

### (a) Angeline

Lesson one: She was paying good attention on the first demonstration on how to apply the procedure of exchange the split patterns.

Lesson two: She mumbled the new tune a little after seeing one of the notes of the tonal pattern being substituted, taught by researcher. It showed that she paid good attention of the instructions of substituting the pitches on the tonal pattern.

Lesson three: Researcher removed the tune, and shuffled the flashcards of the tune, and displayed them in front of her. She looked at the shuffling of the cards, quiet but curiously.

Lesson four: She was very well prepared to play the first pair of tunes that researcher provided, and was about to play them immediately, but researcher hold her from listening the instructions again.

Lesson five: Researcher guided her with the synchronization of pitch and corresponding rhythmic value. In overall, she had no difficulties in understanding the concept of synchronizing every pitch with its regarding beat value.

(b) Afiq

Lesson one: He paid great attention on listening to the instructions and the first demonstration of the exchange of the tonal patterns. He followed instructions well.

Lesson two: When researcher was demonstrating the substitution of a pitch of a tonal pattern, he looked happy and excited that he could make the decision to select any pitch/pitches, to substitute another different pitch and making new tunes from it, and to sight-play it afterwards.

Lesson three: He was paying very good attention on the activity and researcher decided to let him work independently on the arrangement of the flashcards.

Lesson four: He understood instructions and purpose of the lesson, and identify the difference laid between the first pair of tonal patterns quickly.

Lesson five: Researcher guided him slowly for synchronizing the tunes. He listened to the instructions very carefully. In overall, he had no major difficulties in identifying rhythmic patterns and pitch series separately, and combining both the musical elements before arranging the notes on the white board.

(c) Loke Shin Yi

Lesson one: She was paying attention to the instructions, very cheerfully.

Lesson two: She was paying high concentration towards researchers' first demonstration of substituting pitches.

Lesson three: When researcher showed her the flashcards, she showed a reluctant facial expression, taking deep breaths, and lazy to pick up the cards for further instructions. This sounded like she did not feel interested with the activities at that moment.

Lesson four: She was a little over-excited for this lesson, as it sounded easy for her. But she paid good attention on listening to instructions

Lesson five: She was not really concentrate in this lesson, ask many questions, flipping other teaching materials, and not focused very well. However, she did listen to the instructions after several times researcher had explained to her. Lesson one: He listened to the instructions by researcher with good attention, and followed the instructions well.

Lesson two: He listened carefully of researcher's first demonstration of pitch substitution upon a note chosen on the tonal pattern given.

Lesson three: He concentrated on the lesson instructions very well.

Lesson four: Researcher noticed he was not fully concentrating in this lesson. However, he still managed to spot the difference for each pair of tonal patterns and musical tunes, immediately.

Lesson five: He was paying great attention in this lesson. In overall, he had no major difficulties in understanding the concept of combining both musical elements.

#### 4.2.1.3 Summary of commitment observation

Afiq and Angeline were consistently committing well in all five lessons, as both of them were behaving very obediently in all lessons. Loke Shin Yi was committing and paying good concentration at first two lessons, started to be impatience in the third lesson, and a little over-excited during lesson four; and she did not fully concentrate and commit towards the fifth lesson, as she was only bother to observe other musical materials in the classroom. Mitilan's commitment was not consistent. He was not fully concentrate in second and fourth lesson, showing tired expressions; but showing his greatest confidence in lesson five. Thus, it implied that the lesson instructions were not too challenging to be understood and followed, but the students' own classroom behavior had affected their concentration towards the commitment of the lessons, such as Shin Yi's inconsistent focus towards all lessons. This might due to their own interest and motivation level towards different tasks in the five-week lessons. However, this factor did not significantly affect the students' ability to understand instructions, which all of them were able to comprehend the instructions of each piano sight-reading lesson and progress smoothly with practicing all lesson materials. They had no major difficulties in identifying the tonal patterns and practicing the tonal patterns. The commitment related with ability to understand and identify materials (mastery of lower order skills) was crucial for their manipulations of the materials in the lesson, which related with the practice of higher order skills in further.

### 4.2.2 Manipulation observation criteria

The criterion of observing and measuring students' manipulation was focusing on their ability to operate with the materials such as flashcards and magnetic notes after understanding the instructions of each lesson. The related lower order skills being observed are:

- 1. Apply: ability to operate instructions of each lesson
- 2. Remember: ability to memorize facts

- 3. Recall: ability to retrieve facts from memory
- 4. Compare: ability to look for contrast in two different tonal patterns

#### 4.2.2.1 Manipulation observation

The following presented the observation of manipulation of the lesson materials of each student into the five sight-reading lessons in order.

(a) Angeline

Lesson one: She fully understood the application of exchanges towards the tonal patterns, and continued with the exchanges of the tonal patterns efficiently, and confidently.

Lesson two: Her ability to apply the concept of substitution of one pitch upon a tonal pattern had been seen through her confidence of substituting other tonal patterns after she understood the instructions.

Lesson three: In a short moment, she was able to recall the tune from her memory, and she had already sticking the flashcards correctly in order and tidily each on the whiteboard efficiently.
Lesson four: She pointed out the difference in pitch very efficiently towards each pair of the tunes provided to her.

Lesson five: She picked up the steps of synchronization slowly at first, but more efficiently afterward.

(b) Afiq

Lesson one: He understood the purpose of application of the exchange method towards the tonal patterns, and then he continued towards the exchanges of other patterns confidently.

Lesson two: He proceeded towards the substitution of any pitches on the tonal patterns offered efficiently.

Lesson three: He was very confidently remembering the tunes, and arranged the flashcards very carefully according to his memory.

Lesson four: He was efficient when identifying a pitch difference on each pair of tunes. He practiced the patterns correctly on piano.

Lesson five: He arranged every note efficiently, and tidily on the whiteboard, which he understood the concept of synchronization very well.

Lesson one: She was so excited and practice the tonal patterns as fast as she can, so that she can quickly get the related flashcards from researcher and exchange them. She understood the concept of applying exchanges towards the tunes, and can't wait for longer to the coming up next tune to be exchanged and seeing the difference after exchanges.

Lesson two: She understood the concept of applying substitution towards any pitch on a pattern very quickly, and than decided to substitute upon her favored notes on each tonal pattern very efficiently.

Lesson three: She arranged the notation flashcards on the whiteboard by sticking them firmly with no long thinking and uncertainties. After the arrangement of the cards, researcher revealed the pattern again to her, she did not felt surprised, as she was so confident that her arrangement was absolutely correct, and referring back to the answer was not necessary for her.

Lesson four: Each time researcher turned over a new page of a new pair of tunes, she identified immediately, the difference of the particular pitch for the pair of similar musical tunes, always correct and confidently.

Lesson five: She often loses her focus after seeing some students walk pass the classroom door. Because she was slightly off focus, she spent longer time to complete the synchronization of first tune.

Lesson one: As he was a little confused with the instructions at first, he seemed to be gaining confidence over a few practices of exchanging the tonal patterns as he was becoming more familiar with the manipulation of the flashcards.

Lesson two: Researcher could see him trying hard to concentrate, and thought carefully upon identifying the correct pattern.

Lesson three: He responded quite promptly, picking up the cards, and arranged the cards efficiently and in correct order in front of the piano.

Lesson four: He did point out the pitch difference in each pair very efficiently.

Lesson five: Very soon he finished arranging the magnetic notes for the tunes on the white board, and practiced the tune correctly and confidently. This proved that he understood the concept of synchronization very well.

### 4.2.2.2 Summary of manipulation observation

Similarly with commitment, both Angeline and Afiq were manipulating each of the lesson materials very gently, carefully and competently. Shin Yi was behaving rather passive in the fifth lesson that she was not focusing well to absorb new strategy of synchronizing notes, but after a while of encouragement she started to pick up the task. However, she had great capability to manipulate all the lesson materials throughout five-week lessons. Her inconsistency in focusing might due to her decrease interest or motivation in participating the different activities. Mitilan was not consistent in his commitment as mentioned, but he was showing great efficiency of manipulation of the materials especially in lesson three and lesson five. He was very confident in synchronizing the beat values and the pitches during the most challenging fifth lesson. This might due to his great interest towards the particular lessons, and showing less interest towards the previous lessons. All students had no major difficulties in mastering the lower order skills involved in this lesson which are: apply, remember, recall, and compare, which comparing two tunes with locating one pitch difference appeared to be the most less challenge activity for all of them. In general, this showed that the instructions to manipulate the materials in the lessons were not over challenging, but it somehow motivated them to practice the tunes intensively because of different strategies were being suggested to them in order to decipher the tonal patterns in each week.

### 4.2.3 Conclusions of commitment and manipulation observation

All students did not face major problems in commitment and manipulation of lessons. In terms of commitment, they did not faced difficulties in understand concepts, and recognizing the notes and beat values on the tonal patterns. In terms of manipulation, students did not face major difficulties on applying the instructions in the lessons, memorizing facts and comparing contrast of tunes. It proved that commitment and manipulation of lesson materials was significant and crucial for higher order thinking skills to be further involved in the sight-reading lessons.

### 4.3 Role and Function of Higher Order Thinking Skills

One of the main concern regarding research question two is: what is the role and function of higher order thinking skills in teaching and learning during each of the sight-reading lessons?

The findings enclosed the higher order thinking skills that involved in this lesson, and had been classified upon its role and function. This section shall analyzed the functions of the skills due to:

- How each higher order thinking skill applied in regarding lesson, provides opportunities for students to interact with the tonal patterns and tunes in terms of stimulating their visual ability of reading.
- The active key verbs of the particular higher order skills of describing how the skills functioned in each lesson regarding students' interaction with the lesson materials, by following the higher order thinking skills instructions.
- Examples of students' interaction in each lesson provided clearer concept of describing the function of each the higher order skills towards sight-reading experience of the students.

Thus, the following discussed each higher order thinking skills involved in regarding lessons in detail, with students' examples in the lessons to enhance the discussion as well.

From Bloom's fourth level of the taxonomy, analyze means breaking concepts into parts, seeing the interrelationship of the parts as overall structure (Anderson, & Krathwohl, 2001; Churces, 2009; Mardigian, 2011). Marzano said that students' who learn to analyze must be exposed to structure knowledge, and perform more analytical thinking of the knowledge. In integrated thinking model, analyzed was being defined as recognizing patterns, identifying the main ideas, and finding sequence of the ideas (Nesbitt-Hawes, 2005). In this research, analyze skill had involved in lesson one.

### 4.3.1.1 Lesson one

In lesson one, it was observed that analytical thinking was executed by breaking the tonal patterns into half and exchange it to reform a new pattern. Students experienced changing of the "contour" of the pattern by applying the exchange method towards each tonal pattern. For example, both "DGFD" in treble clef and "BFGB" had to be split into "DG", "FD", and "BF", "GB". When breaking the tonal pattern into half and recombined it alternately, they witness the relationship of the pitches in small fragments that form a short tune.

#### 4.3.2 Evaluate

Bloom stated that evaluate is an ability to hypothesize or predict the result of an event (Anderson & Krathwohl, 2001; Churches, 2009; Krathwohl, 2002; Mardigian, 2011;

Munzenmaier & Rubin, 2013). In integrated thinking model, evaluating was defined as ability to verify results and verify the ideas (Nesbitt-Hawes, 2005). It is a deeper level of analyzing. In this research, evaluate skill had involved in lesson one and two.

#### 4.3.2.1 Lesson one

Students comprehended the main idea in this lesson – to sight-read the tonal pattern alternately after its exchange, students had to "rejoin" relationship between both split tonal patterns.

To sight play the pattern correctly, it needed some kind of intuition to hypothesize, or imagining the transformation of the pattern after its exchanges. For example, one of the pattern, CDEr - splitting "CDEr" to its half and exchange to "ErCD" was considered slightly challenging in reading for them, especially Angeline and Mitilan who were slightly weaker in their reading ability. Both of them first played it as "ErDC", because they didn't notice the twist of the "C" and "D" after exchanging the pattern.

It happened again towards the tonal pattern "CBAr" in bass clef. When it had being exchanged towards "ArCB", the crotchet rest in between the pattern might a little misleading the reading; Afiq, Angeline, and Mitilan played it wrongly after exchange. Angeline and Mitilan played it as "ArBC" at first, but Afiq had forgotten the rest and played "ACB". Shin Yi had no difficulties reading this alternate tonal pattern after exchanged it.

#### 4.3.2.2 Lesson two

As observed through this lesson, it was important to allow students to verify the idea of any pitch or pitches on a tonal pattern could be changed and substituted, that the regarding tonal pattern could possibly turn out differently afterwards. The change of the pattern was depended on their own choice of substitution on their selection of pitch (es).

# 4.3.3 Critical thinking

As mentioned, critical thinking was explained as the ability to making judgments of a situation (Foster, 2004, Nesbitt-Hawes, 2005, p. 10; Barahal, 2008). Also, critical thinking was also focusing on making discriminations based on reasoning, which involved "objective thinking" and "scientific thinking" (Foster, 2004, p. 5) Critical thinking was also an ability to observe, solving complexity, and exploring (Barahal, 2008). In this research, critical thinking had involved in lesson two.

#### 4.3.3.1 Lesson two

Evaluators suggested that they probably felt curious for the first time of substitution, thus they were keen to "judge" how the tonal pattern would be different, if a rest had substituted that particular note. Students had to think very thoroughly to predict and reason their own choices of substitution upon the pitches of the tonal patterns. After students had explode substitution to a few tonal patterns; they started to realize the significant of the choice of beats to be substituted on the patterns after practicing with a few tonal patterns.

### 4.3.4 Make decision

Marzano (2000) stated that making decision is the ability to select the best way or best solutions for a situation; it is probably one of the "higher order" way to obtain finest knowledge (Marzano, 2000; Marzano & Kendall, 2007). In this research, make decision skill had involved in lesson two.

### 4.3.4.1 Lesson two

Students could basically think of substituting the 1<sup>st</sup> and 2<sup>nd</sup> beat, the 2<sup>nd</sup> and 3<sup>rd</sup> beat, or the 3<sup>rd</sup> beat and 4<sup>th</sup> beat of the tonal four repeated pitches. Interestingly, evaluators found out that the students hardly thought of choosing 2<sup>nd</sup> and 3<sup>rd</sup> beat to be substituted, accept Loke Shin Yi. Angeline, Afiq, and Mitilan preferred to substitute 1<sup>st</sup> and 2<sup>nd</sup> beat, or 3<sup>rd</sup> and 4<sup>th</sup> beat. Of course, researcher did not dominate their choice of substitution during the lessons. Students had their own right to substitute pitch on own choice. Although researcher couldn't predict how they select the choices, it might be based on random substitution, or a kind of sequences of choices that they plan in their head, but as making decision could make them have more rights to modify the patterns on their own.

#### 4.3.5 Coordinate

Coordinate has the similar meaning as organize and arrange, and it is one of the sub skill of the fourth level – analyze in Bloom's taxonomy (Anderson & Krathwohl, 2001). As mentioned, when it comes to organizing materials, recognizing patterns of its character or its sequence was the key to execute the ability to organize (Nesbitt-Hawes, 2005). Thus, Marzano also stated that coordination involves arranging materials into its attributes (Marzano, 2000). In this research, coordinate skill had involved in lesson three and five.

### 4.3.5.1 Lesson three

The task in this activity was to organize the shuffled flashcards containing the pitches according to the accurate one based on memory. How those students arrange the tunes in the lesson was the same like how children were playing jigsaw puzzle in real life; they think critically, doing a few attempts on arranging the first possible arrangement first, checking whether the notes were being arranged accurately, swapping cards that they think it might be error of such arrangement, hesitating of the order to the pitches, trying to play a few times on the piano keys to re-confirm the order of the pitches, and with a final arrangement after they had confident with it.

Based on the description of their manipulation of materials in this lesson, the difficulties in coordination and arrangement that they encountered in this lesson was related to the technical part, that they need guidance to place the note head correctly on the line or space of each note, and coordinated the spaces between the notes on the board, in order to produce a 4-measure tune with placing the magnetic notes tidily on the board. It was challenging and time consuming too.

#### 4.3.6 Problem solving

Butterworth and Thwaites (2013) stated that problem was described as a situation that caused human a difficulty or trouble to be solved; the problem solving might involve mathematics, shape, and numbers. Brookhart (2010) stated that in order to solve problem, ability of recalling knowledge and identifying problem must take place; sometimes, one must think of new solutions to solve one problem. In this research, problem solving skills had involved in lesson two, three, and four.

#### 4.3.6.1 Lesson two

As observing the students' participation in this lesson, evaluators found out that the whole lesson was actually a problem-solving situation. Students shall choose to substitute any one/two pitch (es) upon the tonal pattern, in order to transform the pattern differently, and practicing to sight-play the new pattern. The choices of substitution of

the pitches by the students were important, because the tonal pattern turn out different in contour, regarding the substitution on different beats. Thus, it encouraged students to alert of the contour difference after their own choice of substitution, and they shall sight-read the notes cautiously according to the pattern.

# 4.3.6.2 Lesson three

Since this lesson was similar as the jigsaw puzzle game that every child used to play in younger ages, it includes a very high potential of problem solving situation in this activity. The aim of the lesson was to recalled the tune from memory and rearrange the regarding flashcards correctly on the whiteboard. Flashcards are good tonal mapping materials that children can re-form the pattern in a secure way.

#### 4.3.6.3 Lesson four

The goal of this lesson was to focus on locating only one different pitch from a pair of similar tonal patterns or musical tunes, and the difference was hidden in the second one. All students able to glance quickly of the whole tune, and straight away point out the difference, because they notice the "small difference in a big pattern".

### 4.3.7 Differentiate

To differentiate is an ability to see more detail interpretation of a concept of analyzing the difference of two events by comparing both of them (Anderson & Krathwohl, 2001; Krathwohl, 2002; Munzenmaier & Rubin, 2013). In integrated thinking model, differentiate is a higher order skill in order to perform comparing and contrasting (Nesbitt-Hawes, 2005). In this lesson, differentiate had involved in lesson four.

#### 4.3.7.1 Lesson four

In this lesson, they were guided to be able to see contrasts of pitches between two patterns very quickly and efficiently.

### 4.3.8 Combine

When synchronizing both main elements of music – pitch series and rhythmic patterns, it was being described as combining elements, which as sub skill of the highest level of the thinking skill – create, in Bloom's taxonomy (Anderson & Krathwohl, 2001; Krathwohl, 2002). Although students were not creating new ideas, but in this highest level of Bloom's taxonomy, it represents a person is developing new ideas in learning (Anderson & Krathwohl, 2001; Mardigian 2011). Marzano described combine as matching, which means matching elements with similarities or with relationships (Marzano, 2000). In this research, combine skill had involved in lesson five.

#### 4.3.8.1 Lesson five

To combine the rhythm and the pitch, and to place correct tune with correct rhythmic value on the white board, students could be a little busy of referring to the pitch, and refer to the beat value again, then find the relevant magnet notes being provided to them, then found the correct staff position to put the "note head" on the correct line or space. While considering to arrange each note by note on the grand staff, according to the pitches series and rhythmic pattern given, they had to think critically and carefully, and to strategy properly that a musical note must had contained two information: its beat value, and the pitch, to match both elements together and place on the grand staff of the white board.

# 4.3.9 Conclusion of role and functions of higher order skills

Based on the analysis in above, the role and functions of higher order thinking skills in the learning and teaching of sight-reading skills were concluded as the following:

- 1. Higher order thinking skills only becoming beneficial when it is being utilized upon existing materials, it encouraged chunking the tonal patterns into parts for deeper interpretation of the tonal patterns.
- Thus, it maximizes the complexity of the tonal patterns and tunes by visual to be sight-played in the lesson, which gives effect towards sensitiveness of pitch and timing reading. It stimulated the visual reading of the notations.

- 3. Provide as many as possible of variety strategies to analyze the chunking of the tonal patterns and tunes visually to break down the musical tonal patterns and tunes into its smallest unit possible, and to reform and reorganize it, in order to encourage students to engage deeper into the thinking of the pitch and rhythm beyond just sight-reading it.
- 4. Longer exposure towards higher order thinking skills formed the habit and trait of thinking deeper upon chunking the tunes, and more chances and opportunities to encounter the "problem solving" of more tunes, that also gives effect towards increasing sensitiveness in pitch and timing interpretation.
- 5. More music tonal patterns (music vocabularies) being improvised by higher order thinking skills thus increase the students sight-reading experiences by encountering the reading of more tunes, with more reading experienced accumulated.
- 6. As mentioned by Churches (2009) regarding Bloom's taxonomy, there is no specific order of utilizing higher order thinking skills in the lessons according to level sequence of the taxonomies. Also, it is necessary that the particular task in each lesson was involving with more than one higher order skills that researcher wish the students to practice with, as long as the higher order skills was executed by the techniques offered in each lesson rationally and reasonably.

## 4.4 Contribution of Higher Order Skills towards Sight Reading

What is the contribution of higher order thinking skills towards sight-reading ability of the students in terms of absorption of sight-reading experience with the lesson contents, regarding their reading of pitch and timing information on the music score, through instructions on manipulating and practicing the musical tunes and tonal patterns in each lesson?

Since sight-reading is a "thinking collaboration" involving many aspects – perception, kinesthetic, memory, and problem-solving skills (Lehmann & Arthur, 2002; Lehmann & Ericsson, 1993, 1996; Waters, Townsend, & Underwood, 1998; Pike, 2012), the "thinking collaboration" was mainly portrayed through the perception of visual skills, which is the chunking of the tonal patterns, and also the role of memorization ability towards the sight-reading skills (Jensen, 2011). Observations were focused upon students' performance in the lessons, which included the main areas of discussions:

- 1. How would higher order thinking skills instruction being discussed in research question two had provided opportunities for students to visually interplay with the varieties of pitches series and timing with tonal patterns offered in each lesson, as becoming part of their sight-reading experiences week by week.
- How higher order thinking skills instructions affected the students' alertness, cautiousness, and ability to sight-read variety of tonal patterns and tunes in each lesson.

3. It was being described and analyzed individually upon the students' individual performance of obeying instructions of higher order thinking skills upon the tonal patterns and tunes in each lesson.

The examples of students' performance in the lessons being enclosed under each student's name in each lesson described the practice of higher order thinking skills that each student went through during the lesson. It served as their personal experience in sight-reading variety musical vocabularies within the participation of the five lessons. Under each higher order thinking skills, only relevant and related examples regarding the students' involvement of the lessons would be enclosed, but not the entire interactions of the all the lessons.

## 4.4.1 Analyze in lesson one

As analyze explained the practices of breaking parts and seeing relationship of the split tonal patterns, the observations was focused on looking into how students explore the tonal patterns by exchanging the tonal patterns by half. As observed of lesson one with the students, this activity involved in "A" being alternates to become "B", caused by asking students to practice tonal patterns and swapping positions of the notation patterns by half in becoming a different tune. For example:



Figure 4.1 Contour change of tonal pattern after exchange by half

# 4.4.1.1 Contribution of analyze in lesson one with examples

Angeline: Where the second pattern CDER provided, where it should be "ErCD" being formed after the exchange, but she played "ErDC" after exchanged the pattern. She was only able to correct the mistake of playing after researcher had reminded her so. She still made the same mistake for "CBAr" which became "ArBC" when played with her left hand (Suppose to be ArCB). As she still "intuitionally" felt that it should be played as "ABCr" after exchanged it.

Afiq: CBAr being exchanged to become "ArCB", but he forgot to include the rest and played it as "ACB"

#### 4.4.1.2 Outcome of analyze

As a result, relates the split tonal pattern by half was challenging the students reading ability by relating the patterns in its logical and reasonable way, such as "CBAr" shall become "ArCB" but not "ArBC". By coping with 10 tonal patterns in this lesson, the exchanges multiplied music vocabulary become 20 tonal patterns to be sight-played. For them, the challenge of practicing the tunes due to the complexity of the tonal pattern increases when the pitches are not in the original order.

### 4.4.2 Evaluate in lesson one

Evaluation represents how students anticipated the changes of the tonal pattern. Thus, the observation was to look into in what way students hypothesized and anticipated the exchange of the split patterns while practicing the tonal patterns offered.

## 4.4.2.1 Contributions of evaluate to sight-reading with examples

Angeline: She took a little longer to read carefully of "FCDC" and its exchange to "DCFC". It looked like she was thinking upon the exchange of the patterns deeply before she was able to sight-play the new pattern.

Loke Shin Yi: Similar as BFGB on bass clef, she still managed to play this pattern well after a minor error in her first try. However, the exchanged pattern after that, GBBF, was a little challenge for her to re-sight-play it, but she still managed to play correctly

after an error in first try. Looked like BFGB being exchanged to GBBF was not a challenging pattern for her to play, that she need not to consider too much upon how the exchanges could caused complexity to the tonal pattern.

Mitilan: For the DGFD pattern in treble clef, his was playing unconfidently of it. While exchanging its pattern becoming FDDG, he was even unconfidently playing it. It seem like he afraid the exchanges might transform the pattern even more challenging for him to practice it. For CBAr, when switching CBAr to ArCB, he played it as ArBC, but after a while of thinking, he played correctly.

# 4.4.3 Evaluate in lesson two

Based on the observation of this lesson, the following description described how students evaluate their own choice of substitution, and sight-reading of the notes being affected through the lesson. For example:



Figure 4.2 "CDEF" tonal pattern being substituted by "rest" at the first and fourth beat

If student chooses to substitute the first or the last pitch, students still sight-read the ascending contour of the pattern. But students will alert themselves to start to sight-reading the tonal pattern with a different tune instead of C. Thus they will remind themselves of starting to play it with "D" note. While sight-read the pattern at right side, students will remind themselves to end at "E" note instead of the "F" note.



Figure 4.3 "CDEF" tonal pattern being substituted by "rest" at the second and third beat

If student chose to substitute the second or the third pitch, it appears to the student as the ascending pattern seem being "corrupted" by a "rest" within it. Students normally remember the ascending contour, but they appears to be more alert while playing the pattern, because there is a rest in between.

Due to observation, since the notes are all repeated, students only deal with the choice of which "position" of notes they want to be replaced by another flashcards, whether the first two Cs, middle two Cs, or the last two Cs. The tonal pattern shall turned out differently depends on their choices of which two consecutive beats to be substituted.



Figure 4.4 Second and third "C" being covered by "FD" provided

## 4.4.3.1 Contribution of evaluate to sight-reading with examples

Each students had undergone the practices of different tonal patterns due to their different choices of substitution of the tonal patterns. Each of them could produced a total of 10 tonal patterns in this lesson. Their choice of substitution of the patterns shall be referred to Appendix J.

# 4.4.3.2 Outcome of Evaluation towards lesson one and two

In lesson one, students only realized that it was a big transformation of the tonal pattern if it was being exchanged by half, and complexity of the tonal patterns increased after an exchange of the patterns by half that challenged them to be extra careful in reading the tonal patterns again. In lesson two, students realized that their own choice of substitution of a pitch or pitches at the tonal pattern could make up another more complex tunes to be sight-play at the moment, and they had to cope with it.

## 4.4.5 Critical thinking in lesson two

Besides problem solving, this lesson provided a very potential situation of reasoning, with "cause and effect" due to the difference of beats of the tonal patterns being substituted could have turned up with a different tonal pattern. Especially, with more tonal patterns provided, they could had more chance to see how different choices had made different changes on the tonal patterns. It based on the students' judgments of their choice of substitution to transform the tonal pattern differently.

## 4.4.5.1 Contribution of critical thinking with examples

Afiq: He often chooses very carefully of the pitch/pitches that he wanted to substitute upon each tonal pattern, and than he sight-played each tonal pattern promptly and correctly.

Mitilan: Towards all ten tonal patterns given to him, he would rather choose to substitute the pitches for the first two beats or the last two beats of the pattern. It was being observed that he was feeling a little not motivated to think deeper, and it was easier or more convenient to solve the decision by just substituting first two pitches or last two pitches for him, during that moment, and just sight-played them correctly at the moment.

## 4.4.5.2 Outcome of critical thinking

As mentioned, critical thinking is an ability to do reasoning and judgment based on objective and scientific thinking, students who were more concerned on how tonal pattern would being transformed, would pay more attention into their selection of pitches being substituted; whereas students who were not concerning too much of the transformation of the tonal pattern, would just rather see how the pattern being substituted after they made the choice.

#### 4.4.6 Make decision in lesson two

Observation of this aspect focused on how students being able to make their own choice of substitution of the pitches, which was very significant that it brought towards their different experience in reading different tonal patterns of each of them.

## 4.4.6.1 Contribution of make decision with examples

Angeline: She quickly covered the 'rest' flashcard upon the C note without much thinking, thus it became rBAG. For the next CCCC pattern, as she was already feeling confident, taking the card that contained "FD" and covers the first two Cs of the pattern,

changing the tonal pattern to "FDCC". She sight-played the pattern confidently. The sixth tune (CCCC became CF-C at bass clef), it was the only tune that she covered the F- minim note upon the two C notes at the middle of the pattern. (Which was the 2nd and 3rd C)

### 4.4.6.2 Outcome of make decision in sight-reading

Based on observation, allowing students to make decision in sight-reading practice could be motivating for students who are very curious about the transformation of the tonal pattern after one of its pitch had been substituted. Because there were provided with the right to do transformations of the patterns.

### 4.4.7 Coordinate in lesson three

In this lesson, observation was focused towards how coordinate played a very important role in the sight-reading lessons, the rearranged of the materials in the lesson did motivate the students to look very detail into every single aspects of the tune being offered.

### 4.4.7.1 Contributions of coordinate in lesson three with examples

Angeline: She arranged the tunes according to memory in a slow pace but confidently.

Afiq: He comprehended the lesson instruction well by arranging the patterns by memory without mistakes in the arrangements.

## 4.4.8 Coordinate in lesson five

In this lesson, observation of coordination was mainly focused on the students' ability to obtain the concept of synchronizing both musical elements, and choosing the correct magnetic note to place on the whiteboard correctly and accurately, pitch by pitch.

## 4.4.8.1 Contribution of coordination in lesson five with examples

Afiq: He arranged every note efficiently, and tidily on the whiteboard, carefully on referring to both pitches and corresponding rhythmic values for each note, which had to be placed on the white board

Loke: Although Shin Yi did not give full commitment at first, but she still arranged first and second tunes correctly, and tidily with correct pitch and timing for each notes on the whiteboard

### 4.4.8.2 Outcome of coordination in sight-reading

The involvement of coordination did provide discipline learning for the students regarding the understanding of the of the "making up" of the tune, which was being organized by fragments of small patterns, and also allow students to look up towards the smallest unit that make up a tune.

In lesson three, since students showed great interest in cards arrangement and organization, it might increase their memory and alertness towards pitch and timing reading because they reform the breaking parts of a tune. In lesson five, all students were highly committed in this lesson because the "technical" part of synchronizes both music elements and arranges the magnetic notes accordingly had attracted them much. As observed, students not just able to understand the two elements that form a musical tune, but also the satisfaction of completing a "make up" of a tune by themselves.

#### 4.4.9 Problem solving in lesson two

As mentioned, they had to solve the task by transforming the ordinary tonal pattern – CDEF, CBAG, CCCC, GGGG in treble and FFFF in bass into a more complex tonal pattern, by just one pitched or two consecutive pitches being substituted by another pitches. The observation focused on their strategies of selection of the pitches to be substituted.

### 4.4.9.1 Contribution of problem solving with examples

Loke Shin Yi: This lesson did motivate her to "make fun" with the substitution of the pitches upon the patterns. For example, confidently, as G minim note given to her, to substitute any two Cs from CCCC, "Em..." She thought a little while, placing the G note upon the 2nd and 3rd C, looked at researcher as asking for confirmation.

### 4.4.10 Problem solving in lesson three

The problem that had to be solved in this lesson was to arrange the tunes correctly with the flashcards that displayed the fragment of the tunes, which they had to memorize the tune first.

### 4.4.10.1 Contribution of problem solving with examples

Afiq: He was careful when arranging for the third tune, "CGAB" on bass clef, seems afraid to arrange wrongly.

Loke Shin Yi: She was actually memorizing the tune by playing a few times of the tune that researcher offered at first; than she was arranging the relevant cards correctly and efficiently according to her good memory of the tonal patterns and tunes offered to her. Sometimes, she took the cards, tried to arrange them, but with errors for the first time. So she played the memorized tune again on the piano, to confirm the notes, than she only able to arrange it correctly for the second attempt of the arrangements.

### 4.4.11 Problem solving in lesson four

They solved the problem by pointing out a pitch different between a pair of tunes. The observation focused on how students locate the difference of pitch.

### 4.4.11.1 Contribution of problem solving with examples

Angeline: As more and more pairs of tunes being showed to her for pointing out the difference in pitch between them, she was getting familiar with the comparison skill and pitch identifying, and getting more efficient in locating the pitch difference with shorter time.

Loke Shin Yi: After Shin Yi had understand researcher's first demonstration of the lesson, each time when researcher turned over a new page, she identified immediately the difference of the particular pitch for the pair of similar musical tunes, always correct and confidently.

### 4.4.11.2 Outcome of problem solving in sight-reading

It was found out that if the task involved problem solving, students were more delighted and attracted to participate in it because it contains a goal that the students had to achieve in the lesson. In lesson two, because of students curiosity of seeing how patterns being transformed if any pitch had been substituted, they were keen to "try" to substitute different beats on CCCC, GGGG, and FFFF each time another two consecutive pitches offered to them, sometimes the  $1^{st}$  and  $2^{nd}$  beat, some times the  $2^{nd}$  and  $3^{rd}$  beat, or the  $3^{rd}$  and  $4^{th}$  beat. Lesson three challenges their memory and their interest towards the "jigsaw puzzle" nature of the activity. In lesson four, students struggled to re-practice both the patterns after identifying the difference, with an alternate note for the second tune, which the second tune was an "alert" for them to play the tune more correctly. In overall, when students were motivated in the activity, the chances that they absorb the maximum experience of underwent different tonal patterns in the activity become higher.

## 4.4.12 Differentiate in lesson four

Observation was focused upon how differentiation had bring benefits for the students to more alert of the note differences when comparing a pair of tunes.

### 4.4.12.1 Contribution of differentiate in lesson four with examples

Angeline: She grasped the pitch different quickly, even though the patterns were longer and the different pitch seems more hidden in the patterns. She became extra alert when playing the rest of the pair of tunes. Although with average fluency on sight-playing the tunes, but her alertness of reading pitch was increase due to longer exposure to comparison of tunes and pitches.

Afiq: He was capable to identify the difference of each pair of musical tunes efficiently, only with slightly struggling in sight-playing the tunes.

Loke: She was alert towards the pitch difference of the second tune of each pair when practicing them.

Mitilan: He managed to identify the difference for each pair of tonal patterns and musical tunes, immediately. But he needed great guidance from researcher in order to practice each pair of the tunes correctly.

# 4.4.12.2 Outcome of differentiate in sight-reading

Based on observation, it looked like the differentiate had brought a visual "cue" in the second tune for them to be extra alert while practicing to sight-play both tunes. Some students might not able to retain that alertness and still "misplayed" the original pitch in the second tune. Some students were more alert towards the difference.

# 4.4.13 Combine in lesson five

As mentioned, combine shares the similar meaning with synchronization and development of new idea in learning. Observation of this aspect focused upon students' interaction in the lesson upon the manipulation of the materials in order to combine both the elements in the music, and the benefits from it.

### 4.4.13.1 Contribution of combine in lesson five

Angeline: Researcher had seen that she was gaining familiarity with referring both rhythmic value and the pitch in order to choose the appropriate magnetic note to place on the board throughout the lesson. This showed that she had obtained the concept of synchronization with two elements very well.

Loke Shin Yi: For the third musical tune, she had started to work it in her own way of completing the arrangement of the tune. She grabbed a bunch of magnetic notes and holding them on her hand first, rather than picking up one by one from the bunch of magnetic notes at the end of the piano there. By then she only needed to focus on looking on the paper sheets that contains rhythm and regarding pitches to arrange the notes on the whiteboard.

## 4.4.13.2 Outcome of combine in sight-reading

Lesson five was most time consuming and challenging because students had to be a little busy referring to pitch and rhythm value at the same time. However, the concept of combine in this lesson of synchronization had revealed the relationship between pitches and rhythmic value. This was a lesson that reminded the students about the elements of musical notes that make up one short tune. Besides, practicing to place the note heads correctly on grand staff was highly interactive for notation learning. It was a rare chance for students to commit with such a concept because this kind of activity was hardly appeared in normal local piano lessons with beginners. Evaluators suggested that this

lesson tasks was another form of puzzling but acting differently as they need to form the tune in a more analytical way.

## 4.4.14 Conclusion of contribution of higher order skills towards sight-reading

In conclusion, based on the whole observation the contribution of higher order thinking skills for each student in the lessons, the students' experience in sight-reading were being controlled with three factors:

- The higher order thinking skills that being instructed to practice the tunes and tonal patterns, which intended to provide complex visual reading practices through chunking of the patterns.
- 2. The number of tonal patterns and tunes offered that enable students to practice and familiar with the skills.
- The complexity of the tonal patterns and tunes, which intended to maximize their ability to code pitch and timing during sight-reading the tunes.

These three factors shall coorperated together in the lessons. For example, more tunes without complexity did not effective as less tunes that complex in terms of the pitches and timing reading in each tonal pattern. Although we could not controlled how much sight-reading experience a student could absorb in the lessons, but in order to provide a task for students in an activity, a few higher orders thinking skills must involved simultaneously in order of strategizing an effective learning situation for the students to

complete the learning. This is significant because it provided a goal and target for the students and directed them to solve the problems within the activities, in order for maximum absorption of experience in learning that would benefit them for further learning.

#### 4.5 Students' Improvement in Sight-Reading after Lessons

How does the experience of reading within the five lessons had influenced students' sight reading ability by comparing their sight reading ability before participate the lessons (pretest) and after the lessons (posttest), in terms of pitch reading, timing interpretation, and fluency of playing?

As mentioned, sight-reading is described by the performer's strength to process highly complicated visual input (musical notations on a score), without chances to correct the errors (Kopiez & Lee, 2006, p. 97). Studies showed that pitch information and timing information are often being processed separately during sight-reading. These two types of information are perceived separately too (Palmer & Krumhansl, 1987; Schon & Besson 2002; Waters & Underwood, 1999). Thus, the accurate perception of timing and rhythm reading, associated with pitch reading was largely depending on the sight-readers' mental capability to construct, and reproduce a sequential pattern (Sloboda, Palmer & Krumhansl, 1987). McPherson (1994) stated that fluent sight-readers are able to retain more notes in visual trace. But less fluent sight-readers often focusing on coding individual notes on the score (Lehmann & Arthur, 2002; McPherson, 1994, Pike, 2012).

This section analyzed their first sight-reading performance during first week (pretest) and seventh week (posttest), in order to compare their sight-reading improvement before and after the participation of the lessons. The analysis of their performance comparing both tests were based on the observation of:

- 1. Pitch
  - Struggling or hesitating in playing certain notes of the tunes, and struggling or hesitating in coding certain intervals – which students might think longer upon which key shall be played regarding the note on the score.
  - ii. If error in sight-reading the pitches occurred, whether students realize the mistake of pitch (es) played and promptly recovered from it, or slow recovery, or not realize the mistake at all, and continue playing the tune.
- 2. Timing information
  - May, or may not considering the timing of the notes might be in minim beat (two beats), dotted minim beat (three beats), and semibreve beat (four beats), but play like all pitches sounded as "crotchet" beat, or did not realize the expect of coding the timing as well.
  - ii. Alert towards the beat values, or alert towards the beat value but not interpreting the timing of the beat values steadily or accurately.
- 3. Fluency of reading

- i. Mistakes that might caused repeated notes, missing notes in reading.
- ii. Hesitations in recognizing notes causing gaps between the pitches of playing the tunes
- Playing too slow or playing too fast, or average in tempo, steadiness of tempo

The following tables enclosed each student's performance in sight-reading, comparing their ability to sight-read the excerpts in the first week that before participate the sight reading lessons (pretest), and the seventh week (posttest) which after participate the sight reading lessons, in terms of pitch recognition, timing interpretation, and fluency of playing the excerpts. Through the detail comparisons with pictorial explanations, it not only seeing the improvement through the outcome of results produced, but also revealed the students' mental capability to cope with the sight-reading test through detail analysis of each of their progress through these weeks.
## 4.5.1 Angeline's sight-reading performance before and after lessons

During Angeline's first attempt of sight-reading unfamiliar tunes, Angeline often played each note very carefully and at a slow pace, making sure that she did not miss any one of them. She was not very confident in sight-reading the notes in overall, although she played correctly in the pitches. She was struggling and was unable to recover the correct pitch in playing some tunes, but yet she continued to play until the end. Nonetheless, there were quite a lot of mistakes and slow reading of some notes. She was facing no major difficulties in coding the pitches but she was a little cautious and prolonged her thinking upon every notes. This caused her slightly weaker in considering the interpretation of the timing as well, which often did not see consistency in her timing. The hands together excerpt fazed her a lot as there were a lot of notes that she took a long moment to ponder in order to play them correctly. No sense of timing being heard in the sight-reading of hands together excerpt because she has put all her effort in hitting the accurate pitches at the moment, although it was not smooth. She still played steadily in treble clef excerpts, slightly weaker in fluency of the bass excerpts, and struggling a lot in hands together excerpts.

During the posttest, she gained confidence in sight-reading. Although some errors still occurred, but the fluency of sight playing for first attempt has increased a little. She became more capable during her sight-reading of treble clef excerpts, in terms of timing sense. Her improvement in sight-playing the left hand excerpts can obviously be seen through her fluency on sight-playing the pitches, but her timing sense was still weak. The same situation happened during her sight playing of hands together excerpt. As a result, her pitch reading ability has gained over five weeks of participation with the activities. But the timing sense had just improved a little. Table 4.1 showed the

comparison of her sight-reading performance before and after the participation of the lessons.

## 4.5.2 Afiq's sight-reading performance before and after lessons

Afiq encounter no major difficulties in sight-reading treble clef excerpts as he sightplayed almost correct but with only slight hesitation in between, with good timing too. Reading notes on the bass clef seems slightly challenging to him, and there were errors and hesitations. However, he completed the left hand session with the most accuracy of pitches that he could perform at the moment. He seemed a little fazed by the coordination nature of both hands in hands together excerpt but he still sight-read the excerpt faithfully. His sight-reading ability was a little weaker in this session, because he is weaker at bass clef reading, which affected his treble clef reading as well.

He sight-read typically perfect for treble clef excerpts at the last session. As the bass clef notes, the notes were sight-read correctly in bass clef excerpts, at least he didn't miss out notes anymore on bass clef notes reading. But he appeared to be a little more cautious to play those bass clef notes this time. During the sight-reading of hands together excerpt, he played almost perfect in pitch accuracy, with a little of inconsistent timing, but the intention to play the notes correctly in timing was seen. A slight false at the end of the excerpt heard, but he recovered it promptly. Unlike his struggling manner during the sight-reading of hands together excerpt in our first week, he was more confident on reading the same excerpt in last lesson. He played with better fluency, but very cautiously.

Researcher could see his intention towards the coding of timing information from each test, but it had been affected by his concentration being drawn towards pitch coding. In overall, his sight-reading ability has improved during our last lesson due to pitch reading and fluency of playing, however, there were only slight improvement of his ability of interpreting timing sense. Table 4.2 showed the comparison of his sight-reading performance before and after the participation of the lessons.

## 4.5.3 Loke Shin Yi's sight-reading performance before and after lessons

During the first attempt of sight-reading the excerpts, Loke Shin Yi was typically a fluent sight-reader in all three sections, but she seems over confidence and tends to ignore the timing sense in overall. However, she paid more attention in sight-reading the hands together excerpt. She coordinated her both hands well, but still a little weaker in playing tunes with both hands together on middle C position, with some mistakes in coding the notes.

During the last session of sight-reading in the seventh week, her sight-reading ability on treble notes was nearly perfect in this time, a little rushing in playing but with correct timing interpretation. However, she started not paying attention when sight-reading left hand excerpts, she was often distracted when heard someone pass by the classroom (however, the classroom door was closed, but the door glass was partially transparent). Her performance on the three left hand excerpts was not sounding consistent. As she had lost her focused on reading the notes correctly. It seems like she wished to finish the test faster as she could. She lost focused a little on reading the notes correctly. She did not interpret the timing in the excerpts as well. Thus, it was an average performance.

For hands together excerpt, the pitches were correctly played, but the timing was not consistent. Her intention of coding the beat values was seen, but not consistent and not accurate.

In overall, she did not face difficulties in sight-reading more complex tunes, due to the participation of the five lessons had actually gained a lot of confidence in her to challenge more complex tunes. However, she was not patient and not focusing all the time during the last lesson, causing her to deteriorate in her sight-reading accuracy of the last lesson. Her sight-reading performance improved in terms of gaining certainties in reading, but not behaving very well during the last week, that causing her not to sight-read the tunes very fluently. Table 4.3 showed the comparison of her sight-reading performance before and after the participation of the lessons.

## 4.5.4 Mitilan's sight-reading performance before and after lessons

During the first attempt of sight-reading, although he played the treble notes correctly with consistent timing, but it was not a confident performance with hesitations on playing certain notes. The same happened with sight-reading the bass clef notes, which he hesitated on playing a few pitches in between of the excerpts, not confident too. He struggled to finish the sight playing of the hands together excerpt with correct pitches, but no timing information was interpreted. He did not looked confident in sight-playing this excerpt. Thus, he did not offered consistent timing in his playing too. He managed to play the excerpts fluently, but sounded cautiously and unconfidently.

During the seventh week, he showed a little more confidence in sight-reading the treble notes and played nearly perfect too. He managed to play the pitches correctly for bass clef excerpts but only correct timing for the third bass clef excerpt. But it was more confident in overall. He was a little not confident in playing hands together excerpt too. As he started correctly, but played very carefully until he made one mistake in first phrase. He started the second phrase wrongly but recovered after that. As expected, he played almost all correct notes, more confident this time. But no distinct timing information interpreted in his sight-playing this time. The timing of dotted minims, minims and semibreves were not interpreted well in his sight-reading performance of this excerpt.

In overall, throughout his participation of the lessons, researcher could see the lessons had helped Mitilan in certain aspects. He found enjoyment in certain activities. His reading ability was not too poor as being described by her piano teacher, but his lack of concentration had pulled him down in his reading ability progression. The lessons were helping him overcome the fear of reading the pitches that improved in the sense of his confidence of note reading. Researcher supposed by gaining confidence has led to a rise of the accuracy in note reading compared with pretest. However, he did not show significant improvement on timing coding. Table 4.4 showed the comparison of his sight-reading performance before and after the participation of the lessons.

## 4.5.5 Conclusion of students' improvement in sight-reading

In conclusion, after the participation of the sight-reading lessons with higher order thinking skills, the students' sight-reading ability had improved in a few aspects compared between pretest and posttest:

- 1. All students showed more confidence in reading all the tunes offered during last week of sight-reading test.
- 2. As confidence in sight-reading had gained, all students had improved in terms of fluency of reading, regarding their less struggling and less hesitations of reading the notes while playing, and also more cautious and alert towards recognizing the notes, which it caused them to play with more steady tempo.
- 3. All students showed improvement in terms of pitch reading of treble notes, bass notes, and hands together excerpts during the sight-reading performance. With more obvious improvement of treble excerpts, secondly with bass excerpts and a little improvement of hands together excerpt.
- 4. However, students did not show significant improvement of timing interpretation during the performance. During the pretest, students were most often pay over attention towards reading the pitch aspects but sometimes fail to consider the timing sense; in the last session, this shortage had been improved a little but it was not significant, students were tended to pay more focus on playing the pitch correct first but tend to overlook the timing aspect.

#### 4.6 Summary

Findings in research question one showed that students did not face major difficulties in manipulating and commitment of the instructions in the sight-reading lessons, thus all students were able to progress with the further instructions of higher order thinking skills in each lesson.

Research question two analyzed the function and role of higher order thinking skills largely based on the students' manipulation of the instructions during each lesson, and analyzed the function of each higher order skills involved by enclosing examples of students' interaction in the classroom.

In research question three, it was being discussed deeper into the contribution of the higher order skills involved in each lesson towards students sight-reading experience during the participation period.

Finally, research question four analyzed students sight-reading performance during first week and seventh week, in order to compare their improvement of sight-reading before and after the lesson period. Further discussions of the result of findings and analysis would be enclosed in chapter five.

## **CHAPTER 5: CONCLUSION AND DISCUSSION**

#### **5.1 Review of Research Questions**

The research questions of this study include the finding of:

- 1. Students' commitment and manipulation of the sight-reading instructions in the piano sight-reading lesson.
- 2. The role and function of higher order thinking skills in the piano sight-reading lessons.
- The contribution of higher order thinking skills in piano sight-reading lessons towards the students' experience in piano sight-reading and also their improvement in reading musical notations.
- 4. The students' improvement in sight-reading ability comparing between before and after the lessons.

#### **5.2 Discussion**

First and foremost, as mentioned in literature review, educationalists and philosophers had done researches in ranking the thinking processes as higher order and lower order (Butterworth & Thwaites, 2013; Quality Enhancement Plan, 2014). This categorization

was typically crucial where different level of thinking skills brought to different learning outcomes. The findings and analysis regarding first and second research question being addressed in this research was coherent with the distinction of the order of the skills when looking into the students' mastery of lower order thinking skills first before deeper discussion towards higher order thinking skills.

The results regarding research question one showed that all students provided good commitment and manipulation of instructions in each lesson, which was representing the mastery of lower order thinking skills, before further practice of the higher order thinking skills in the lessons. The necessity of looking into students' performance of lower order skills was highly supported by Bloom's taxonomy, which was stressing on the hierarchy of strictly mastering the lower levels first before proceeding to higher order thinking skills (Abeles, 1994; Anderson & Krathwohl, 2001; Churches, 2009; Eisner, 2000; King, Goodson, & Rohani, 2005; Krathwohl 2002; Mardigian, 2011; Munzenmaier & Rubin, 2013). Butterworth and Thwaites (2013) stated that commitment in learning is the priority of absorbing knowledge. Also, manipulation of the lesson materials is essential because it is the students' ability to master the learning by basic learning skills (Nesbitt-Hawes, 2005). Furthermore, looking into students' commitment and manipulation of the lesson materials in this research was significant due to:

 The pedagogy ideas that being introduced in these sight-reading lessons was original and first-handed. Thus, the enclosed of the observation of lower order skills in the lessons significantly proved that students had no major difficulties in understanding the lesson instructions, and eligible to participate further of the lessons.

- 2. Since it was being stressed that higher order thinking skills were build upon lower order skills, the result of the findings through students' manipulation and commitment of the lessons becoming solid and supportive, as the ground for further analysis of students' participation in the piano sight-reading lessons with higher order thinking skills.
- 3. As mentioned, lower order skills and higher order skills were intersecting each other in every lesson plans and curriculum planning (Lewis & Smith, 1993; Krathwohl, 2002). Thus, it was impossible to discuss lower order skills separately from higher order thinking skills, in terms of analyzing students' participation in the lessons, because lower order skills contributed to the mastery of higher order thinking skills.

Since the result showed good commitment and good manipulation of the students, it brought forwards the more operative findings and observation towards the role and function of higher order thinking skills in research question two. In general, the levels of higher order thinking skill had been categorized into key verbs that helped readers to understand its particular function and operation in learning (Anderson, & Krathwohl, 2001; Brookhart, 2010; Churches, 2009; Iowa Department of Education, 2009; Jonassen, 2000; King, Goodsman, & Rohani, 2005; Marzano, 2000; Marzano, & Kendall, 2007; Nesbitt-Hawes, 2005).

Regarding research question two, the distinction of the lower order and higher order skills had lead to the high attention of observing the involvement of higher order thinking skills in the sight-reading lessons, so that the "higher order" skills would not being confused with those skills who did not required higher cognitive extends. The findings regarding research question two had revealed the following aspects:

- As a result, it showed that observation method had become significant in order to describe the partaking of role and function of the higher order thinking skills towards the lessons. Because the key verbs become more valuable, clarify, practical, and realistic when it was being discussed about their utilization upon existing tonal patterns and tunes that being explored by the students during the lessons, particularly in chapter four.
- 2. Through observation, students' responses and involvement to the lessons directly provided the answers of the operation of those higher order-thinking skills.
- 3. The higher order skills only becoming beneficial in terms of its involvement with the deeper interpretation of the tonal patterns, which any existing unit of knowledge.
- 4. The findings and result of research question two also proved that the strong linkages of higher order thinking skills and sight-reading skills, in terms of analysis the tonal patterns and the tunes visually, which visual learning had being included as a form of thinking and organizing (Vitulli & Santoli, 2013). Its high possibility, logicality and rationality of utilizing higher order thinking skills into piano beginner sight-reading lessons, especially in terms of visual reading of the notations by chunking patterns, had improved the concept of enhancing the visual skills to interpret knowledge more thoughtfully with students' corporation (Vitulli, & Santoli, 2013).

As mentioned in literature review, since various experts had provided the pathways of activating higher order thinking skills in any learning situations, the execution of the higher order skills highly depends on the methods of lesson that utilizing it. Based on the conclusion of the findings, the pedagogy idea of the lessons unified the students towards the pathway of more optimum learning in terms of sight-reading musical notations.

Since the levels of thinking involving in each lesson in this research was not strategized by the sequence of the thinking levels, the only argument and conflict in was that the philosophy behind Bloom's taxonomy of stressing the mastery of the thinking levels step by step and not encouraging bridging orders of it. Marzano (2000) did not fully agreed towards Bloom's taxonomy and stated that it was not being proved by researches, therefore he structured a new taxonomy by his own, but consisting six levels of thinking as well. Marzano (2000) supported Bloom's philosophy of mastering the skills levels by levels, but his words was more rounded due to the concerned on the rationality in the education objectives, rather than the obsession of strictly applying the skills level by level which not often applicable in all learning situation.

Thus, it is impossible to include all thinking levels into sequence during a lesson planning or structuring a curriculum planning, because some activities may not necessary to reach the highest order of thinking which is to evaluate and to create, this is depending on individual choice (Churces, 2009; Krathwohl, 2002). Although thinking shall be enhanced level by level, but sometimes bridging orders or the levels allow a person to refer back previous skills in order to strengthen the thinking ability, therefore it is not often necessary to start from the lowest order of thinking skills in academic (Lewis & Smith, 1993; Krathwohl, 2002).

Since the results of this research showed that more than one thinking skills involved in the lessons were logic and viable for learning, the idea of the existence of both lower order thinking skills and higher order thinking skills in the lessons of this research was rational for the teaching and learning of sight-reading. When the findings of the higher order thinking skills in each sight-reading lesson become significant, the contribution of the skills towards sight-reading experience and students absorption of the experiences became crucial regarding research question three.

In research question three, result showed that coding of the chunks through visual input was typically crucial for sight-reading stimulation, and it was highly supported by the fact from experts who done much research in sight-reading practices due to visual learning as a part of thinking (Kopiez & Lehmann, 2009; Lehmann & McArthur, 2002; Pike, 2012). Again, it was understood that the higher order thinking skills were effectively practiced through visual skills, which provided very powerful learning of the existing learning units (Beal, Bolick, & Martorella, 2009; Coufal & Coufal, 2002; Crawford et al., 2009; Jensen, 2011; Manifold, 1995; Sandell, 2011; Schmidt, 2007; Werner, 2002; Zwirn & Libresco, 2010). This had been known as a form of problem-solving too (Kopiez & Lehmann, 2009).

The findings proved that the higher order thinking skills in the lessons were contributed effectively towards the students' sight-reading ability of interpreting pitches and timing. Since higher order thinking skills had strong linkage with sight-reading skills in terms of interplay with visual input as chunking the tonal patterns, the findings of this research was more complete and rounded, by looking into the contribution of higher order thinking skills that involved in students' sight-reading experience in reading pitches and timing, in terms of the "cooperation" of three factors:

1. Looking into the practices of the appropriate higher order skills by the students in order to cope with the practices of the tunes and tonal patterns.

- Looking into the students' responses and their ability to cope with the complexity of the tonal patterns and tunes, which visually deciphering the patterns by the higher order skills and technique instructions.
- 3. The number of tonal patterns and tunes provided in each lesson, to determine how much a students shall involved in the practices of the skills upon those patterns, which had being strategized during pilot studies.

Due to the students' absorption of the sight-reading experiences, the most highlighted purpose of this research was to examine how those sight-reading experiences obtained from the practices of higher order thinking skills had improve students sight-reading ability before and after the participation of the lessons. Pictorial explanation was playing great role in examining the students' piano sight-reading improvement.

Numbers of studies showed that pitch information and timing information are processed separately during sight-reading. These two types of information are perceived separately too (Palmer & Krumhansl, 1987; Schon & Besson 2002; Waters & Underwood, 1999). Hence, the observation upon students sight-reading ability during first week showed that students sight-read the notes largely by focusing priory towards the pitch reading than the timing interpretation later. This was causing inconsistency in tempo and fluency because they only able to correct mistakes due to pitch error but not timing error. They seem did not able to interpret the timing information at the same time, which only the more proficiency reader would pay slightly more attention on the timing sense. Furthermore, accurate perception of timing, and accurate rhythm reading largely depends on the sight-reader's ability to construct and reproduce a temporal pattern, which was based on their mental capability (Palmer & Krumhansl, 1987).

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During the seventh week of addressing sight-reading attempt on identical excerpts, the findings showed that there were significant improvements in students' pitch reading and fluency of playing, but only insignificant improvement in timing interpretation in overall. When looking back to the description of the students' performance in chapter four, it was found out that students gained confidence in sight-reading the pitches of the excerpts. This signified that when they had more confident in sight-reading the pitches, it leads towards "extra" alertness towards the timing at the same time. In its opposite way, when students are not confident on reading the pitch, they might not have extended capability to code the timing at the same time. In short, the observation in this research showed that the slight improvement of timing and fluency was largely dominated by the improvement of pitch reading, especially for amateur piano beginners.

The only unexpected condition happened was due to a sudden behavior change of the third subject, Loke Shin Yi, she was totally behaving differently, becoming not attentive towards the sight-reading session at the seventh week, that causing her deterioration of her performance in sight-reading after all lessons participations. However, as the observation in this research was only due to Loke Shin Yi's sight-reading ability at the moment, and it was obviously being affected by her attention span on that particular week; this did not strongly signified that she did not absorb the experiences from the lessons, but sight-reading learning was a longer journey than expected whose her lost of attention was only affected the particular moment. It was believed that the experiences in the lessons had enriched her sight-reading journey and it might benefits her improvement in her future piano learning.

## **5.3** Conclusion

In conclusion, the students have improved in their sight-reading ability after participating in the five-week sight-reading practices with thinking skills and techniques. Results show that students did not develop much in terms of timing sense, but they had improved in pitch reading competency, and also confidence in sightplaying tunes, which was a crucial factor of the improvement. In overall, researcher believed the activities offered in this research have motivated them to move further in their piano learning. The sight-reading activities associated with thinking skills and techniques are more likely engaging students in active learning, rather than passive learning of sight-reading skills.

## 5.4 Suggestions for Future Research

It was suggested that further researche should be carried on a longer period basis of sight-reading learning, with a suggestion of more thinking skills and techniques as a dominant part of the curriculum in sight-reading learning, to be fitted into regular piano lessons. More complex thinking techniques can be applied in sight-reading practices, and with more emphasis on rhythm improvement as a suggestion of further study in this area. Since thinking skills are functioning as a tool to strengthen brain capabilities, researcher believed further thinking activities applied in sight-reading practice will soon be a solid concept and approach in terms of enhancing sight-reading ability among young musicians of all ages.

Also, further research should concentrate more on individual improvements of sightreading ability with thinking skills applied, especially at the age of 7 to 10 years old. This is because researches are not vastly conducted on younger piano beginners, due to the sight-readers' ability that does not often achieve a maturity level that can be measured correctly upon their accuracy of reading, in terms of their ability to code with pitches and rhythmic values, as well as their fluency of playing. At the same time, similar research purpose should be proposed to the sight-reading development of other solo instruments.

#### 5.5 Summary

This chapter had presented the discussions of the result obtained from each research questions followed by the sequence of: (a) discussing the solid concept of priority of commitment and manipulation of the lesson materials before further practices with higher order thinking skills in the piano sight-reading lessons, (b) the contribution of the regarding higher order thinking skills towards students' experience in sight-reading, (c) concept of strong linkage between higher order thinking skills and visual reading skills, and (d) discussing the students' improvement of sight-reading ability after the participation of the lessons. Although one female subject had behaved out of focus during the sight-reading test at seventh week, unexpectedly, but the students' sight-reading journey had been enriched with the opportunity to participate in this lesson which she was benefited from it too. The research suggests that more concentration of research in the similar area and the same research mode could be done to other solo music instruments for young beginners.

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# **APPENDIX A**

#### Consent letter for Music School Principals

To Whom It May Concern:

I am conducting a research that investigates the effectiveness of an approach to music education where opportunities for thinking skills – in this case, musical thinking activities with interactive approaches, and interactive learning features, are embedded into the sight-reading practices. The study, in part, fulfills one of the requirements for a Master degree in Music Education from University of Malaya Master in Arts. The interest for this study evolved as a result of my life quest to offer quality music educator and professional musician. Thinking skills are being acknowledged and confirmed as a necessary fundamental learning feature that is vital in every single aspect of learning. It should be equally essential towards the learning of piano playing via music reading. I appreciate your willingness to allow me to conduct the research in the piano beginners at your music school in order to collect data for this study.

As per the guidelines of University Malaya research protocols, I will maintain the data in confidentially. Students' names and personal details will never be published in association with their participation in this study.

Please refer to the enclosed attachments of the agreement of allowing the research to be conducted within your music school area, and with music school piano beginners as participants in this research. Thank you.

Sincerely,

(SIOW LIAN CHENG) Postgraduate Master of Arts (Performing Arts) RGA090014 Cultural Center University Malaya

# **APPENDIX B**

# Reply Letter of Music School Principals

Re: Participation of Piano Students into the exposure of thinking skills of music reading for piano beginners

welcomes the opportunity to participate with Siow Lian Cheng (Carolyn) in exploring thinking skills and interactive activities as adapted into regular individual piano teaching, with our students as part of completing her submission of dissertation, in fulfillments of the requirement for master degree dissertation, University of Malaya.

- 1. Since piano teaching is also one of our main music courses that we had offered to all ages of students, the adaptation of thinking skills with interactive activities could seem very natural and excepted as a part of teaching in classroom.
- 2. We believed that not only utilize thinking skills and techniques in teaching, open new horizon into private music education, but to also provide very good feedback to Ms. Siow.

I authorize		to	conduct
educational r	esearch for the piano beginners at my music school		

Principal's name:

Principal's signature:

School name:

School's official stamp:
### **APPENDIX C**

#### Consent Letter for Piano Teachers

Dear Piano Teacher,

I am conducting a research study in music education and piano playing. The purpose of this study is to examine the effectiveness of applying thinking skills towards piano lessons, in order to investigate the development of music reading ability of piano beginners, after they undergo a short period of learning music and piano playing.

Educational research studies are conducted to find out answers to questions about teaching and learning. Student participation is necessary and very important to educational research. With your help, we might be able to answer questions or make an important discovery that will benefit many students in our schools as well as inform teachers of better ways to teach.

this study. If you decided to participate, your students will learn how to play piano with a different approach, and to read musical notes with an alternative way. Your student will participate into this research during your regular music teaching lessons.

If you have any questions or concerns regarding this study, please do not hesitate to ask the researcher at any time. Please return the assent and consent forms to the researcher as soon as possible.

Please refer to the enclosed attachments of the agreement of allowing the research to be conducted during your regular piano and music lesson, and with your piano students/beginners as participants in this research. Thank you.

Sincerely,

(SIOW LIAN CHENG) Postgraduate Master of Arts (Performing Arts) RGA090014 Cultural Center University Malaya

## **APPENDIX D**

### Reply Letter from Piano Teachers

Re: Participation of Piano Students into the exposure of thinking skills of music reading for piano beginners

To:

I have read this form and the research study as been explained to me. I have been given the opportunity to ask questions and my questions have been answered to my satisfaction. If I have additional questions, I have been told to contact the researcher at any time. I agree to allow my student to participate in the research study described above and the students' parents will receive a copy of this assent form.

Teacher's signature	Date	
Students' signature	Date	
Researcher's signature	Date	

## **APPENDIX E**

Week	Lesson Title	Materials
1 <sup>st</sup> Week	Sight-Reading Test (Students not alert about being tested)	• 3 treble clef sight-reading excerpts, standard notation form. All in 4 measures, each in one row, all in 4/4 time, ranging from middle-C until treble clef's G note only (5-note range). 3 excerpts were printed in the same page.
		• 3 bass clef sight-reading excerpts, standard notation form. All in 4 measures, each in one row, all in 4/4 time, ranging from middle-C until bass clef's F note only (5-note range). 3 excerpts were printed in the same page.
		• 1 hands together middle-C position excerpts, standard notation form. 16 measures, in 4/4 time, printed on one whole page.
2 <sup>nd</sup> Week	Exchange patterns	• 10 paper sheets printed with 10 different 4-beat tonal patterns in standard notation form. Each printed sheets are clipped with another sheet behind which contains the "answer" of the tonal pattern that is being exchanged from the original pattern.
		• Each tonal pattern has been prepared with similar flashcards with standard notation, but they are being split into half of each. Thus, there are 20 notation flashcards split from 10 patterns.
3 <sup>rd</sup> Week	Substitute pitches	• One CDEF notation flashcard (treble clef), and one CBAG notation flashcard (bass clef).
		• Two crotchet rest flashcards.
		• One CCCC notation flashcard, and one GGGG notation flashcard, where GGGG notation flashcard can be turned upside down, becomes FFFF notation flashcard in bass clef.
		• Various two-beat notation flashcards prepared for substitution of the four-beat flashcards.

Materials used in each lesson and sight-reading performance

4 <sup>th</sup> Week	Memorize Musical Tunes	• Four paper sheets, printed with different tonal patterns and musical tunes on each sheet.
		• Related notation flashcards, with a mixture of single beat notation flashcards and two-beat notation flashcards where the students will use those flashcards to arrange the memorized tunes during the third lesson.
5 <sup>th</sup> Week	Compare Tunes	• 8 paper sheets provided, each sheet is printed with a pair of tonal patterns or musical tunes in standard notation where only one pitch is different from the other pattern.
6 <sup>th</sup> Week	Synchronize Tunes	• Rhythmic flashcards consist of only rhythmic notes in 4/4 time.
		• Three paper sheets with a complete grand staff and a musical tune printed on it with all semibreves, which mean no timing information on each pitch.
		• A white magnetic board, with a grand staff on it.
		• Big colorful magnetic notes in crotchet, crotchet rest, minim and semibreve shapes where the note size is fitted to the staff spaces.
7 <sup>th</sup> Week	Sight-Reading Test (Students not alert about being tested)	• Materials used were exactly the same as the first week, as students were required to sight-read the same excerpt again in order to witness their development in reading ability.

### **APPENDIX F**

First Sight-Reading Lesson Procedures (Exchange Tonal Patterns)

## **Exchange Tonal Patterns**

#### **Procedures**:

1. The following tonal pattern for treble clef is given and practiced by students on the keyboard:



2. Teacher provides students with two flashcards, and asks them to combine these two patterns together, to form a 4-beat tonal pattern.

Example:



3. Teacher requests student to combine these two patterns as below (treble clef not provided):



4. Students shall try to swap the two pattern cards on their own, and to see what new pattern has been formed after exchange, as below, students should practiced the new pattern again:

Example:



5. At the end, teacher sums up how many patterns had been notated down n collected; students has to revise the patterns.

## **APPENDIX G**

Tonal Patterns Used in First Lesson











## **APPENDIX H**

Second Sight-Reading Lesson Procedures (Substitute Pitches)

# **Substituting Pitches Upon 4-beat Patterns**

#### **Procedures:**

- A)
- 1. Teacher provides students with a 4-beat tonal pattern card as below: (without treble clef provided, but students shall be told upon the position of the notes.)



2. After students had practiced the tune above, teacher provides another flashcard contains a quarter rest as below:



3. Students are required to make decision to pick any notes from the 4-beat tonal pattern, after a note has choosen, students should cover (substitute) the note with the "rest" flashcard provided, as below:



Students pick this note, and covered with the rest, becomes:



4. Students shall practice the new tonal pattern again. For further pattern recognition of the tonal pattern, teacher shuffles, and provides a sheet with a few more patterns as below while asking students: "which matches the pattern above? Pick up the one"



B)

1. Teacher provides student with a 4-beat tonal pattern card, which the tonal pattern card contains with four equal notes in crotchet beat, CCCC



2. After practicing these repeated 4-beat notes, teacher provides students a flashcard as below:



3. Similar as before, students should pick any two Cs on the flashcard on their own choice, then they should cover (substitute) the two Cs with the flashcard on it.

Example:



Student chooses these Cs in the middle, and "substitute" it with provided pattern. It becomes



- 4. Students required practicing this new tune.
- 5. With further on strengthening pattern recognition, teacher provides a sheet with more tonal patterns, asking students to pick up the matching tonal pattern as the above one:



## **APPENDIX I**















## APPENDIX J

Angeline	Afiq
a) CDEF became CDRF (Treble)	a) CDEF became CDRF
b) CBAG became RBAG (Bass)	b) CBAG became CBAR (left hand)
c) CCCC became FDCC (Treble)	c) CCCC became FDCC
d) CCCC became G-CC (Treble)	d) CCCC became CCG –
e) CCCC became CCGB (Bass)	e) CCCC became CCGB (left hand)
f) CCCC became CF-C (Bass)	f) CCCC became CCF – (left hand)
g) GGGG became GGDF (Treble)	g) GGGG became GGDF
h) GGGG became ECGG (Treble)	h) GGGG became ECGG
i) FFFF became FBGF (Bass)	i) FFFF became BGFF (left hand)
j) FFFF became FFAC (Bass)	j) FFFF became ACFF (left hand)
Loke Shin Yi	Mitilan
Loke Shin Yi a) CDEF became CDRF	Mitilan a) CDEF became RDEF
Loke Shin Yi a) CDEF became CDRF b) CBAG became CBAR	Mitilan <ul> <li>a) CDEF became RDEF</li> <li>b) CBAG became CBRG (left hand)</li> </ul>
Loke Shin Yi a) CDEF became CDRF b) CBAG became CBAR c) CCCC became CCFD	Mitilan <ul> <li>a) CDEF became RDEF</li> <li>b) CBAG became CBRG (left hand)</li> <li>c) CCCC became CCFD</li> </ul>
Loke Shin Yi a) CDEF became CDRF b) CBAG became CBAR c) CCCC became CCFD d) CCCC became CG – C	Mitilan <ul> <li>a) CDEF became RDEF</li> <li>b) CBAG became CBRG (left hand)</li> <li>c) CCCC became CCFD</li> <li>d) CCCC became G – CC</li> </ul>
Loke Shin Yi a) CDEF became CDRF b) CBAG became CBAR c) CCCC became CCFD d) CCCC became CG – C e) CCCC became CGBC (left hand)	Mitilan <ul> <li>a) CDEF became RDEF</li> <li>b) CBAG became CBRG (left hand)</li> <li>c) CCCC became CCFD</li> <li>d) CCCC became G – CC</li> <li>e) CCCC became GBCC</li> </ul>
Loke Shin Yi a) CDEF became CDRF b) CBAG became CBAR c) CCCC became CCFD d) CCCC became CG – C e) CCCC became CGBC (left hand) f) CCCC became CF – C (left hand)	Mitilan <ul> <li>a) CDEF became RDEF</li> <li>b) CBAG became CBRG (left hand)</li> <li>c) CCCC became CCFD</li> <li>d) CCCC became G – CC</li> <li>e) CCCC became GBCC</li> <li>f) CCCC became CCF –</li> </ul>
Loke Shin Yi a) CDEF became CDRF b) CBAG became CBAR c) CCCC became CCFD d) CCCC became CG – C e) CCCC became CGBC (left hand) f) CCCC became CF – C (left hand) g) GGGG became GDFG	Mitilan <ul> <li>a) CDEF became RDEF</li> <li>b) CBAG became CBRG (left hand)</li> <li>c) CCCC became CCFD</li> <li>d) CCCC became G – CC</li> <li>e) CCCC became GBCC</li> <li>f) CCCC became CCF –</li> <li>g) GGGG became DFGG</li> </ul>
Loke Shin Yi <ul> <li>a) CDEF became CDRF</li> <li>b) CBAG became CBAR</li> <li>c) CCCC became CCFD</li> <li>d) CCCC became CG – C</li> <li>e) CCCC became CGBC (left hand)</li> <li>f) CCCC became CF – C (left hand)</li> <li>g) GGGG became GDFG</li> <li>h) GGGG became ECGG</li> </ul>	Mitilan <ul> <li>a) CDEF became RDEF</li> <li>b) CBAG became CBRG (left hand)</li> <li>c) CCCC became CCFD</li> <li>d) CCCC became G – CC</li> <li>e) CCCC became GBCC</li> <li>f) CCCC became CCF –</li> <li>g) GGGG became DFGG</li> <li>h) GGGG became GECG</li> </ul>
Loke Shin Yi a) CDEF became CDRF b) CBAG became CBAR c) CCCC became CCFD d) CCCC became CG – C e) CCCC became CGBC (left hand) f) CCCC became CF – C (left hand) g) GGGG became GDFG h) GGGG became ECGG i) FFFF became FFBG (left hand)	Mitilan <ul> <li>a) CDEF became RDEF</li> <li>b) CBAG became CBRG (left hand)</li> <li>c) CCCC became CCFD</li> <li>d) CCCC became G – CC</li> <li>e) CCCC became GBCC</li> <li>f) CCCC became CCF –</li> <li>g) GGGG became DFGG</li> <li>h) GGGG became GECG</li> <li>i) FFFF became BGFF</li> </ul>
Loke Shin Yi <ul> <li>a) CDEF became CDRF</li> <li>b) CBAG became CBAR</li> <li>c) CCCC became CCFD</li> <li>d) CCCC became CG – C</li> <li>e) CCCC became CGBC (left hand)</li> <li>f) CCCC became CF – C (left hand)</li> <li>g) GGGG became GDFG</li> <li>h) GGGG became ECGG</li> <li>i) FFFF became FFBG (left hand)</li> <li>j) FFFF became ACFF (left hand)</li> </ul>	Mitilan <ul> <li>a) CDEF became RDEF</li> <li>b) CBAG became CBRG (left hand)</li> <li>c) CCCC became CCFD</li> <li>d) CCCC became G – CC</li> <li>e) CCCC became GBCC</li> <li>f) CCCC became CCF –</li> <li>g) GGGG became DFGG</li> <li>h) GGGG became GECG</li> <li>i) FFFF became BGFF</li> <li>j) FFFF became FFAC</li> </ul>

## Choice of Pitches to be substituted in Lesson Two

## **APPENDIX K**

Third Sight-Reading Lesson Procedures (Memorization of Musical Tunes)

# Memorization: Arranging Cards to Form the Tonal Patterns by Memory

#### **Procedures:**

1. For example, teacher is showing students the following tonal pattern:



2. Students shall practice with the tune, they are requested to memorize the tune while practicing it. After that, teacher shall take away the tonal pattern, and provide them tonal pattern flashcards randomly as below:



3. Students were asked to rearrange the tonal patterns on the flashcards orderly, according to their memory of the tonal pattern being practiced before. After they arranged it, they shall play it again to check its accuracy, before teacher reveals the answer to them.

## APPENDIX L

## Tonal Patterns Used in Third Lesson





## **APPENDIX M**

Fourth Sight-Reading Lesson Procedure (Comparison between A Pair of Patterns)

# **Comparison between Two Tonal Patterns**

### **Procedures:**

1. Teacher provided music sheets with two tonal patterns on it. There is only one difference of pitch between the two patterns, students have to point out the different note, and practice the patterns.



## **APPENDIX N**

Tonal Patterns Used in Fourth Lesson









g)







## **APPENDIX O**

Fifth Sight-Reading Lesson Procedures (Synchronization of Rhythm and Pitch)

## Synchronization of Rhythmic Patterns and Tonal Patterns

#### **Procedures:**

- 1. Teacher chooses a 4-measured rhythmic pattern, and another set of tonal pattern that also contains a group pitches.
- 2. Teacher demonstrates of tapping the rhythmic pattern, and how the tune being played. Teacher should tell the students, both rhythm and tune will be "synchronized" (mixed) together, and form a tune that is associated with the rhythmic pattern that being choose just now, with an example of the synchronized tune formed. Make sure student understands the activity purpose before they start to participate.
- 3. With prepared magnetic notes and white board, students start to arrange the pitches according to the rhythmic patterns provided in 4 measures. Students should place the correct notes with the correct rhythm value order provided, and arrange the magnetic notes on the grand staff of the white board.
- 4. After students had completed, teacher showed the answer sheets, and request students to practice with the tune one time





## **APPENDIX P**

Tonal Patterns Used in Fifth Lesson





## **APPENDIX Q**





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## **APPENDIX R**

Sight-Reading Test Excerpts - Hands Together, TB1

# **All The Pretty Little Horses**









#### **APPENDIX S**

#### Procedures in Sight-Reading Performance

Procedures of Sight-Reading Performance in First Week and Last Week:

- 1. The first page of the excerpt consisted of T1, T2, T3
- Students shall ready with their right hand on middle-C position, and look through the three excerpts for one minute.
- 3. Students may start to sight-play the three excerpts for their first attempt after a look through.
- 4. The next page contained B1, B2, and B3.
- Students shall ready with their left hand on middle-C position, and look through three bass clef excerpts for one minute.
- 6. Students may start to sight-play the three excerpts for their first attempt after a look through.
- 7. The whole third page contained TB1.
- 8. Students shall ready with both hands on middle-C position, and look through the excerpts for one and half a minute time.
- 9. Students may start to sight-play the excerpt for their first attempt.
- 10. The similar procedures occurred during the final sight-reading performance, after each student had undergone five sight-reading lessons.
- 11. Students would sight-play all same excerpts, but would not be reminded of those excerpts had been played in first week.

## APPENDIX T

Images of Teaching Materials Used in Sight-Reading Lessons



Colorful magnetic notes on white magnetic board #1



Colorful magnetic notes on white magnetic board #2



4-beat tonal pattern flashcards for treble notes and bass notes (middle-C position)



1-beat single pitch flashcards for treble and bass notes (middle-C position)



2-beat tonal pattern flashcards for treble and bass notes (middle-C position)