Educating pre-primary teachers to teach for multiple intelligences

Kwok Cheung CHEUNG
University of Macau, Macao, China

Purpose: This paper presents experiences of in-service teacher education in Macao which seeks to educate preprimary teachers to teach for multiple intelligences. A thematic topic unit designed by a group of teachers is included to reveal what teachers can do to achieve the ideal of individually configured education.

Argument: This paper starts with a concise explication and comparison between characteristics of modern and post-modern education. Notions of individually configured life-long educational journey, efficiency-driven versus ability-driven curricula, teaching for multiple intelligences, Pentagon model for problem solving and creative production, as well as assessment for learning, are presented to point out directions of curriculum reform in the 21st century.

Conclusion: Initial observation from teacher educator's viewpoint is that teachers' mindsets are altered along the direction envisaged in the theory of multiple intelligences.

Keywords: individually configured education, instructional design, multiple intelligences

教育幼稚園教師適性教育以促進幼兒多元智能的成長

目的：本研究旨在探討如何在澳門幼稚園進行師資培育，教導教師實踐適性教育以促進幼兒多元智能的發展。本文記載了一群在職教師所設計的主題教學單元，用以說明具體實施情況。

論點：本文闡述了現代教育和後現代教育的主要特徵，並扼要地對這兩種作出比較。為了指引廿一世紀課程改革的路向，本文闡釋了下列五項議題：(1) 適性終身教育旅程；(2) 效率推動之課程和能力推動之課程比較；(3) 促進多元智能學習與發展的教學；(4) 解決問題和從事創造的五角概念模型；以及(5) 促進學習與發展的評量。

結論：從教師觀點所作的初步結論，指出教師舊有的思維運作模式，是可以按照多元智能理論的期許而有所改變的。

關鍵詞：適性教育、教學設計、多元智能

1. Modern and Postmodern Education – A Concise Explication and Comparison

Characteristics of Modern Education

The 21st century is an era whence life sciences flourish. It is also an era of transition from modern to postmodern life-long education (see Cheung, 2003a for discussion). We can use the Landscape Garden Metaphor to illustrate what modern education is like, whereas the Habitat Metaphor is more appropriate for post-modern education. In a landscape garden, one focuses mainly on the resources available to configure an appropriate setting that conforms to the ideal of the garden designer. Likewise, 20th century education resembles a landscape garden in that schools pay attention to time, personnel and material resources. Through cybernetics control mechanisms similar

to air-conditioners, schools strive to control and coordinate deployment of resources to achieve the three main objectives of schooling: excellence, effectiveness and efficiency. Because of the need to guarantee educational quality, failure in schooling is a common phenomenon. Those who manage to succeed can be likened to horticulture valued so much by their creators. However, it is regrettable to say that their inner attributes may have been seriously distorted, or even spoiled during the molding procedures.

Characteristics of Postmodern Education

Educators are still exploring how one should conceptualize postmodern education properly. We aspire that it is an education that seeks to liberate human potentials and help children grip their fate firmly in their own hands (Cheung, 2003a). This idea is stemmed from the conception of our living in a life-long learning society in the 21st century. A habitat is a place where plants and animals feel homely to grow and glow. Each species can have the opportunity to liberate their inner potentials at a time and place most conducive to its growth and sustained development. All the species constitute a scenic picture full of colors, animation and harmony. Under this backdrop, postmodern education is conceived as an education journey within one's culture along which children realize their life goals. It is important that children have an early idea of where their life journey are heading, and that they are not alone but accompanied by their parents, teachers and peers. Teachers recognized that experiences and environments play pivotal roles for children development. Through collaboration, children engage in knowledge co-construction and cooperative learning.

Notions of Individually Configured Life-long Educational Journey

At the turn of the new century, curriculum development is increasingly influenced by proposals of life-long education. In this post-modern era, curriculum designers re-conceptualize the main aims of education as: (1) ascertain that every individual's inner potentials to have good chances to grow and glow; (2) empower children to grasp firmly their fate for positive living. They research into using Gardner's Theory of Multiple Intelligences to design learning materials to realize the ideal of individually configured education (Armstrong, 1987, 1994; Campbell, Campbell & Dickinson, 1992; Gardner, 1983, 1985, 1991, 1993, 1999; Lazear, 1999a, 1999b, 1888c).

In fact, notion of individually configured education is deeply rooted in traditional Chinese culture (Cheung, 2001, 2003a, 2003b). Two thousand years ago the Confucian School analyzed this notion in great details from the philosophical perspective. Nowadays, educators re-examine the same notion based on advances in neuro-psychology and anthropology. Gardner's theory of multiple intelligences, and his proposals for individually configured education, has been acting as a catalyst for educational reform during the past two decades. The intimate links to traditional Chinese culture explain why teachers endorse ideas of multiple intelligences favorably (Cheung & Wai, 2001; Cheung & Lou, 2003).

2. MI-inspired Curriculum and Instructional Design – Some Guiding Principles

Efficiency-driven versus Ability-driven Curricula

At the end of 20th century, curriculum design in the Chinese speaking communities was essentially efficiency-driven, emphasizing articulation of a blueprint with clearly spelled out starting points, finishing points, and migrating paths (Cheung, 2004). Due to advances of life sciences and anthropology, revised concepts of learning and development inspire curriculum planners to adopt

the idea of an ability-driven curriculum, recognizing the self-evolving and self-organizing nature of human minds. Educational objectives nowadays are not envisaged simply as fixed signposts, nor are they stated in detailed taxonomic forms. Instead, curriculum is depicted as an individually configured educational journey within which individuals target and orient themselves for advancement and transformation. Thematic textbooks are organized as a series of stories describing events likely to happen in children's everyday lives. Consequently, parents and teachers know how to accompany their children to explore life journeys along which potentials are nourished and talents cultivated.

Contribution of Gardner's Theory of Multiple Intelligences

Thematic study units weaving and paving the life-long education journey should be anchored on the four pillars of education – i.e. learning to know, learning to do, learning to live together, and learning to be (Cheung, 2003a, 2003b). Specifically, children develop languages, perception (including the natural, spatial and musical) and thinking (including logical-mathematical) abilities. Attention is paid on children's health (especially bodily-kinesthetic aspects) to train them fit for play and study. Children are initiated to engage in self-reflection and behave appropriately in accordance with norms and expectations. They cultivate good habits, are able to protect themselves, and learn to steer their own life journeys with confidence and responsibility. Knowledge of Theory of Multiple Intelligences is envisaged as essential to guide structuring learning experiences along trajectories of child development.

Teaching for Multiple Intelligences

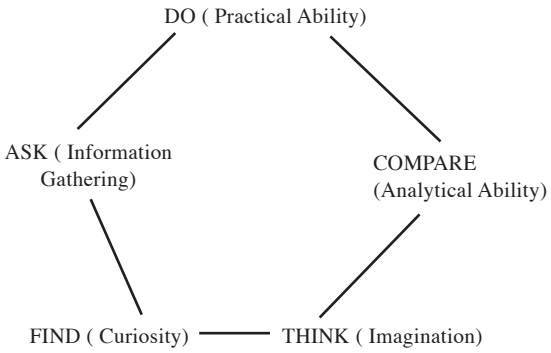
At the heart of Teaching for MI is the construction of intelligence-fair learning environments (Cheung, 2003a, 2003b; Lazear, 1999a). Through support of school policy and provisions, every child is guaranteed opportunities to nourish their potentials as fullest as practicable. They become willing to learn, able to learn and happy to learn, thereby setting a firm foundation for their future studies and career planning. The primary purpose of assessment is to foster learning and guide the direction of child development (Assessment Reform Group, 2002). "Assessment of Learning" is to give way for "Assessment for Learning" to tie in with the philosophy of Teaching for MI (Cheung, Wai, & Chiu, 2000/2002; Cheung, 2004; Stiggins, 2002). The emphases are no longer degree of knowledge transmission, or comparison of the relative magnitudes of IQ.

Pentagon Model for Problem Solving and Creative Production

Since applications of the Theory of Multiple Intelligences are targeted at inspiring potentials and nourishing capabilities, particularly creative problem-solving abilities, there is a need to establish a Pentagon model for problem solving and creative production so as to guide instructional design of learning activities (see Figure 1).

Figure 1: Pentagon model for problem solving and creative production

The pentagon model delineates conspicuously five processes facilitative of problem solving and creative production, namely, FIND, THINK, ASK, COMPARE and DO (see Cheung, 2003a for a discussion). In a nutshell, FIND is the process of arousing curiosity, whereas THINK seeks to stimulate imagination in children's minds. ASK is about gathering of information, particularly those conducive to problem solving. COMPARE requires children to analyze present situations and compare these situations with what they can think of to decide which idea is more viable. If the decision is a positive one, children should be encouraged to DO to nourish practical abilities.



Educating Teachers for Professional Development

At the Faculty of Education of the University of Macau, in-service preprimary teachers are trained to practice individually configured education based on the notions of life-ling education and MI-inspired pedagogy. Teachers are educated to conceptualize the three years of kindergarten schooling as an educational journey for the 3-5 year old children. A series of thematic study units need to be developed that are compatible with the philosophy of a post-modern curriculum as described above. Teaching for multiple intelligences and assessment for learning are two important aspects needed to be mastered by the teachers in the in-service teacher education program. What follows is an illustrative example of a thematic study unit entitled World of Flowers designed by five teachers teaching in different kindergartens in Macao (see Table 1). It illustrates what can be achieved after teachers are introduced: (1) aims and objectives of an educational journey in a post-modern era; (2) use of Gardner's think-board for designing a MI-inspired thematic study unit; and (3) design of an assessment inventory for purposes of assessment for learning.

Aims and Objectives of Educational Journey

According to the Outlines of Early Childhood Education (Trial Version) released by Basic Education Department of Ministry of Education of China in September, 2001, educational activities for the 3-5 years old children should exhibit sufficiently three basic design principles: (1) activities should be appropriate for children's present level of development, and there is a certain degree of challenge as well; (2) activities should conform to the practical needs of the children, and there is room for future development as well; (3) topics of study comprising of interesting problems and phenomena should stem from children's everyday life; it should facilitate extension of children's experiences and horizon as well.

In this regard, five in-service kindergarten teachers designed a thematic study unit for the 5-year old children. This unit, called World of Flowers, comprises of six group learning activities inside and outside classroom. Bearing in mind the four pillars of education for the 21st century, the teachers drafted the following six aims and objectives for this two-week educational journey:

- Know the name of the flowers encountered or presented to them, as well as understand the different species, structures, growth essentials and usage of flowers.
- Develop consciousness of protection of natural environment and habitat.
- Learn how to complete work independently, spend time wisely, and understand the importance of commitment and responsibility.
- Learn how to handle human relationships, demonstrate spirits of cooperation and solidarity.
- Learn how to learn autonomously, and develop problem solving abilities.
- Good at expressing oneself and demonstrate creativity in one's work done.

Using Gardner's Think-board for designing a MI-inspired Thematic Unit

In the thematic study unit World of Flowers there are six group learning activities, namely, (1) Dancing in the sea of flowers; (2) Know a little bit more of flowers; (3) Children as designers; (4)

A beautiful flower exhibition; (5) I can also do experiments; and (6) Encounter with nature. These activities collectively seek to inspire students' eight multiple intelligences together. Teachers used a

3. Educating Teachers to Teach for Multiple Intelligences

1. Linguistic Teacher guide children to observe flowers brought from their homes, and engage them in group discussion. Children are initiated to point out salient characteristics of flowers and similarities and differences amongst the different types of flowers. They are encouraged to ask questions during the discussion. Children are instructed sentence format: "This is a yellow rose."	**2. Logical-Mathematical** Allow children to classify the flowers brought back from their homes. Children organize and share the information gathered with peers. Through information search, children understand the growth processes of flowers, as well as the required conditions of growth. Children's logical thinking and problem solving abilities can be elevated during experiments pertaining to conditions of growth of plants.	**3. Musical** 1 3 5 5 6 6 6 5 6— 6 5 6- 5 5 3 5 3 2 1 0 3 2 1 3 3 2 2 1— (Chinese song, lyric omitted)
4. Bodily-Kinesthetic Ask children to play the role of different casts according to the rhythm of music. Children make use of their limbs and facial expression to create postures and styles, e.g. different shapes of flowers, different movements of frogs, snails and butterflies.	Thematic Study Unit: World of Flowers Grade: K3 (5-years old)	5. Spatial Allow children to deploy the materials and tools prepared for them to engage in collaborative design and art production.
6. Inter-personal During preparation for a talent show of their learning outcomes for their parents, children are taught to cooperate with peers, be considerate, and interact with others in a constructive manner.	7. Intra-personal During the daily watering plants activities, children learn how to organize their daily schedule wisely, as well as recognize the importance of commitment and responsibility. Children value flowers as a living thing and learn to take good care of them.	8. Naturalist Teacher brings children to gardens to observe different species of flowers. Children are initiated to be curious about the wonders of nature, and develop consciousness of care and protection of the natural environment.

lesson planning template called Gardner's think-board to structure these activities in the thematic study unit (Cheung, 2003a, 2003b). As shown in Table 1, the think-board is drawn in the form of a "#" grid with the theme World of Flowers placed at the center, and the six activities undertaken as a response to the eight ways of knowing are organized to surround the center square. Teachers can see at a glance from the think-board to judge whether the design of the thematic study unit is intelligence-fair or not. At this moment, teachers should do two things to ensure that the design conforms to the philosophy mentioned in the earlier parts of this paper. First, they should reexamine the aims and objectives of the educational journey to see if they tie in well with the activities contained in the "#" grid. Second, teachers are asked to use the "Pentagon Model for Problem Solving and Creative Production" to check if the activities designed by them involve processes (i.e. FIND, THINK, ASK, COMPARE, DO) conducive to cultivation of creativity and problem solving abilities (see Appendix 1 for the results of teachers' reflection and analyses).

Design of an Assessment Inventory for Assessment for Learning

Table 2 shows a sample of an assessment

inventory (one item for each of the eight multiple intelligences) to illustrate the format it may take although a longer one is not only viable but also preferable. For each of the eight performance items, a 3-point Likert scale is deployed (S=3, A=2, L=1). Appendix 2 presents a detailed summary of the assessment environment and assessment criteria of the eight performance items in the assessment inventory. It is noteworthy that adequacy of assessment criteria can only be evaluated afterwards, i.e. after the completion of the teaching experiments. Because of space limitation, evaluation of the teaching experiments is not reported here.

** Teachers' ratings should be based on assessment guidelines detailing assessment criteria and environment.*

In assessment for learning, assessment is regarded naturally as part of effective planning of teaching and learning so that goals pursued and criteria applied in assessing the anticipated performance are clearly delineated. In addition, assessment is focused on how children learn, rather merely on what children learn. This is sensitive and constructive assessment as it fosters children's confidence and enthusiasm in learning. Evidences for satisfying the assessment criteria are planned ahead and interpreted subsequently in contexts of the education journeys that children engage in. Assessment criteria are focused more on good work than individual children. This is contrary to assessment of learning which emphasizes mainly differential qualities of outcomes of learning. Progressive levels of assessment criteria make guidance and improvement possible. Teachers can pinpoint children's strengths and/or weaknesses and indicate how they may be addressed based on the theory of multiple intelligences and other theories of learning (see Assessment Reform Group, 2002 for the ten principles of assessment for learning).

4. Conclusions

This paper reports an attempt to educate preprimary teachers to teach for multiple intelligences for purposes of individually configured education. In Macao, application of the theory of multiple intelligences is a hot topic of research. Teachers are eager to know if such research can bring about changes so that children find schooling

Table 2: An example of assessment inventory (one item selected for each of the eight multiple intelligences)

Assessment Items	Ratings		
	S	A	L
1. Able to listen carefully and good at using languages during communication with others.	3	2	1
2. Fond of classifying objects into groups and grades.	3	2	1
3. Able to move body and limbs in accordance with the rhythm of music.	3	2	1
4. Fond of using hand gestures and body languages.	3	2	1
5. Able to choose materials and tools according to one's wishes and ideas for creative production.	3	2	1
6. Willing to accept other's advice, is emphatic, considerate, and able to coordinate and resolve conflicts.	3	2	1
7. Able to make a clear plan in accordance with one's aspirations and needs.	3	2	1
8. Sensitive to sound, color, scent and texture encountered in nature and surrounding environment.	3	2	1

lively and enjoyable. Furthermore, they fervently hope that children are not only more willing to learn but also more able to learn. In this regard, teachers need to be initiated to make a shift from their traditional didactical teaching to a modern MI-inspired pedagogy. Concepts of life-long education journey, Gardner's think-board, Pentagon model of problem-solving and creative production, assessment for learning, and others explicated in this paper have been shown to be welcomed and endorsed by the teachers. Our initial observation from teacher educator's viewpoint is that teachers' mindsets are altered along the direction envisaged in the theory of multiple intelligences. More applications and evaluation of this approach of instructional design is recommended in the future and in other parts of the world before a firm conclusion can be drawn.

References

Assessment Reform Group (2002). *Assessment for Learning:* Ten principles. (Retrieved from: http://www.assessment-reform-group.org.uk)

Armstrong, T. (1987). *In Their Own Way: Discovering and Encouraging Your Child' s Personal Learning Style*. J.P. Tarcher, Los Angeles.

Armstrong, T. (1994). *Multiple Intelligences in the Classroom*. Association for Supervision and Curriculum Development, Alexandria, VA.

Campbell, L., Campbell, B., & Dickinson, D. (1992). *Teaching and Learning through Multiple Intelligences*. Zephyr Press, Tucson, Ariz.

Cheung, K.C. (2001). *Children Achieve with Fragrant Outcomes: Multiple Intelligences Assessment and Individually Configured Education*. Crystal Educational Publications, Hong Kong. (In Chinese)

Cheung, K.C. (2003a). *The Nourishing Spring Wind: Exemplary Case Studies of Multiple Intelligences Inspired Education*. Crystal Educational Publications, Hong Kong. (In Chinese)

Cheung, K.C. (2003b). *Bathing in the Spring Wind: Multiple Intelligences Curriculum and Instructional Design*. Crystal Educational Publications, Hong Kong. (In Chinese)

Cheung, K.C. (2004). *How to Implement Multiple Intelligences Assessment and Individually Configured Education?* Plenary speech presented at the international conference of multiple intelligences theory and its application and the third annual conference of DISCOVER in China (DIC) (Beijing, China, May 2004).

Cheung, K.C., & Lou, L.H. (2003). *Children Aspire for Joyous and Good Education: An Experimental Research Study on the Exploitation and Evaluation of Multiple Intelligence*s. University of Macau Publication Center, Macao. (In Chinese)

Cheung, K.C., & Wai, F.L. (2001). *Joyous Education for the Young Children: Multiple Intelligences and Teacher Professional Development*. Macao Computer Association, Macao. (In Chinese)

Cheung, K.C., Wai, F.L., & Chiu, K.H. (2000/2002). *School-based Multiple Intelligences Learning Evaluation System (SMILES)*. Crystal Educational Publications, Hong Kong.

Gardner, H. (1983). *Frames of Mind: The Theory of Multiple Intelligences*. Basic Books, New York.

Gardner, H. (1985). *The Mind's New Science: A History of the Cognitive Revolution*. Basic Books, New York.

Gardner, H. (1991). *The Unschooled Mind*. New York: Basic Books.

Gardner, H. (1993). *Multiple Intelligences: The Theory in Practice*. Basic Books, New York.

Gardner, H. (1999). *Intelligence Reframed: Multiple Intelligences for the 21st Century*. Basic Books, New York.

Hoerr, T.R. (2000). *Becoming a Multiple Intelligences School*. Association for Supervision and Curriculum Development, Alexandria, VA.

Lazear, D. (1999a). *Eight Ways of Knowing: Teaching for Multiple Intelligences*. SkyLight Training and Publishing, Arlington Heights.

Lazear, D. (1999b). *Eight Ways of Teaching: The Artistry of Teaching with Multiple Intelligences*. SkyLight Training and Publishing, Arlington Heights.

Lazear, D. (1999c). *Multiple Intelligence Approaches to Assessment*. Zephyr Press, Tucson, Ariz.

Stiggins, R.J. (2002). Assessment Crisis: The Absence of Assessment for Learning. *Phi Delta Kappan,* 83, 10, 758-763.

Author:
Dr Kwok Cheung CHEUNG, Professor of Education (Curriculum and Instruction), Faculty of Education, University of Macau, Macao, China.

Email: kccheung@umac.mo

Appendix 1:

Analysis of the design of MI-inspired thematic study unit (World of Flowers) using the Pentagon model

	FIND	THINK	ASK	COMPARE	DO
Dancing in the sea of flowers		Imagine the movements and shapes of flowers when different types and tunes of music are played.	Children engage in cooperative exchanges; ask teachers meaningful questions in order to decide on what to perform and how to perform.		Children use their limbs to create different styles and movements of flowers in accordance with the rhythm of music presented to them.
Know a little bit more of flowers	Children browse the reading materials prepared by teachers and explore if there is anything that is of interest to them.		Children ask meaningful questions as a result of their information search and gathering.	Through observation, touching and smelling, children know different species of flowers, recognize the relative sizes, colors, and conditions of growth of the flowers.	

Children as designers	Children find out how to make use of the materials and tools prepared by their teacher.	Children think about queer and new ways of designing artworks.	Children ask teacher questions to clarify their ideas and doubts.	Children compare different ways of composing art designs.	Children use the materials and tools to experiment whether their ideas work out or not.
A beautiful flower exhibition	Children find out what are needed in order to organize a flower exhibition, e.g. venue, display boards, posters, invitation cards, etc.	Children think about the layout of the venue, the design of the invitation cards, etc. with an aim to attract the attention and interests of the audience.		Children cast votes to decide what they plan to do. They evaluate the viability of the proposals put forward by peers.	Children prepare the exhibition together as a team.
I can also do experiments		Children think about the conditions of growth of plants.	Children search and gather information on the conditions of growth of plants.	Children record observations and compare experimental results on conditions of growth of plants.	According to time schedule, children engage in watering plants and observing growth of plants daily.
Encounter with nature	Children are initiated to be curious about the wonders of nature.	Children become aware and conscious of care and protection of the natural environment.	Children ask questions during their encounters with the nature	Through comparison with observation on pollution and conservation, children become familiar with the relationships between humanand nature.	

Appendix 2:

Assessment criteria and assessment environment of selected multiple intelligence items of thematic study unit – World of Flowers

Assessment Item	Assessment Criteria		
	Strength/High Level of Interest S(3)	**Equivalent to Age/Grade Level A(2)**	**Weakness/Low Level of Interest L(1)**
1. Able to listen carefully and good at using languages during communication with others.	Always listen carefully to what teachers and peers say; able to express clearly one's own opinions during communication with others.	Often listen carefully to what teacher and peers say; able to use relatively clear language to express one's thoughts and feelings.	Unable to listen carefully to what teacher and peers say; looks shy and speaks with a soft voice during communication with others.
Assessment Environment: During daily classroom teaching, teacher observes how children listen and respond during communication with others so as to analyze language listening and speaking abilities of the children.			

2. Fond of classifying objects into groups and grades.	In activities, able to think of a variety of methods to classify objects into groups and grades.	In activities, able to find out a method to classify objects into groups and grades.	In activities, unable to find out a method to classify objects into groups and into grades; can only complete tasks with hints and assistance by others.
Assessment Environment: During information search and collection, teacher observes how children experiment classifying objects into groups and grades so as to understand the logical analytical abilities of the children.			
3. Able to move body and limbs in accordance with the rhythm of music.	Able to use limbs and body to express contents of song and music creatively; can move accurately according to the rhythm of music.	Generally do not have any problem to move body and limbs in accordance with the rhythm of music.	Need assistance from teacher and peers in order to move body and limbs roughly in accordance with the rhythm of music.
Assessment Environment: During play activities, teacher observes how children use their bodies and limbs to move in accordance with the rhythm of music, particularly on whether they can complete tasks on their own.			
4. Fond of using hand gestures and body languages.	During activities, good at using hand gestures and body languages to create actions and movements with rhythm and in an elegant manner.	During activities, usually do not have any problem to use hand gestures and body languages to create actions and movements.	Need assistance from teacher and peers in order to use hand gestures and body languages to imitate actions and movements.
Assessment Environment: During musical activities, teacher observes how children use hand gestures and body languages to express themselves, particularly on whether they can complete task on their own.			
5. Able to choose materials and tools according to one's wishes and ideas for creative production.	Able to choose materials and tools according to one's wishes and ideas for creative production; this is usually done autonomously and with initiative.	Generally do not have problem to choose some materials and tools provided for some sort of artistic production.	No personal opinion; always follow instructions from teacher and peers so as to choose some materials and tools to complete tasks assigned.
Assessment Environment: During art and design activities, teacher observes children to see if they can choose materials and tools according to their ideas and wishes for artistic production so as to understand their creativity and problem solving abilities.			
6. Willing to accept other's advice, is emphatic, considerate, and able to coordinate and resolve conflicts.	Willing to accept others' opinions and advices; able to coordinate during interactive activities; during discussion able to be emphatic and considerate so as to resolve conflicts.	Generally willing to accept others' opinions and advices; begin to learn how to coordinate and resolve conflicts during interactive activities.	A bit self-centered during interactive activities; only accept others' opinions and advice when assisted with teachers; always in conflict or disagreement with others during discussion.
Assessment Environment: During preparation of the learning outcomes exhibition and during arrangement and decoration of the exhibition venue, teacher observes children from various angles and perspectives to understand how children get along with peers.			
7. Able to make a clear plan in accordance with one's aspirations and needs.	Able to make a clear plan according to one's aspirations and interests; able to adhere to plan and schedule to complete tasks.	Able to make a clear plan according to the instruction of teacher; under teacher's guidance can generally complete task on schedule.	Unable to make a plan oneself according to one's aspirations and interests; need continuous guidance and monitoring to follow a plan.
Assessment Environment: During the watering plants activities, teacher observes children whether can carry out observations, watering plants, and data recording according to the experimental conditions and time schedule.			

8. Sensitive to sound, color, scent and texture encountered in nature and surrounding environment.	Able to explore the natural surroundings autonomously; is curious and sensitive during observations; have interests in thinking about relationships between man and environment.	Generally have interests and some curiosity in exploring the natural surroundings under guidance of teacher.	Do not have any interest in the natural environment; unable to make close and careful observation; need continuous guidance and monitoring to complete task.

Assessment Environment: During tour visit of gardens in kindergarten's surrounding environment, teacher observes how children interact with nature so as to understand their interests, aspirations and abilities to explore the wonders of nature.