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The Possibility of Replacing Visual Sense with Tactile Sense in the Spatial Representation of the Blind

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ABSTRACT

The paper studies the possibility of replacing visual sense with tactile sense in the spatial representation of the blind. Subjects of the study come from Chiming Senior High School in Taiwan (eleven persons) and regular colleges (five persons), totaling sixteen in all. Their visual conditions are classified into: congenitally blind with no light sense (six persons), congenitally blind with light sense (five persons) and acquired totally blind (five persons). The drawing task focused on real-life object and sketch model. The 84 drawings were classified based on the spatial representation development stage of the blind proposed by I and Shiu (2001) and Kennedy (1984). Results show that visual condition and age both have influence on spatial representation of the totally blind. The spatial representation development of the totally blind continues even beyond 18 years of age, while the development of most of the sighted is stable. The results show that insufficiency of visual conditions delays the spatial representation development of an individual, yet does not terminate the spatial representation development of the totally blind. However, tactile sense does not offer enough spatial messages for spatial representation. Thus, the totally blind are limited and they fail to naturally adopt any advanced projection system. Education, drawing experience and the motivation of drawing are all key factors that enhance spatial representation of the totally blind.

Introduction

In the realm of children drawing development research, spatial representation development has always been the most crucial issue. Drawing research of the blind has gradually caught scholars' attention in recent years. Among the researchers who proposed clear definitions for drawing development stages of the blind is Kennedy's discourse of the six developmental stages (Kennedy, 1984). The other is I and Shiu's theory of the five developmental stages (I & Shiu, 2001). The two groups provided different observations and descriptions toward drawing development of the blind. They also have different opinions in the graphic information obtained through tactile sense in spatial representation development.

Although some researchers (D'Angiulli & Maggi, 2003) claim that drawing development is inborn, its foundation lies in children's knowledge of space and perceptual principles. However, it is still under debate whether tactile sense can replace visual sense to provide key spatial information for the blind to successfully transmit three-dimensional objects to a plane through visual expression even without learning projection systems or representation strategies. The following is a discussion of the two discourses and their possible influences on education.

Tactile Sense Can Replace Visual Sense

Kennedy (1984) categorizes more than 700 drawings of the blind into six categories, from which he proposes six drawing developmental stages. (1) List drawings: using respective marks to indicate composing elements in the environment. Connection of the elements is based on the creator's definition. (2) Outlined separate features: drawing the objects' respective contour features, but connection yet to be established. (3) Connected features: drawing the objects' features, with the sidelines of the surfaces all connected. (4) Vantage point: drawing object features using vantage point. (5) Metaphoric drawings: breaking off the representation of previous stages and proposing indirect implications. For instance, curved lines of a flange are used to symbolize a rolling wheel. (6) Diagrammatic drawings: lines do not only represent the contours of an object but also present a

specifically-represented characteristic. For example, thick lines suggest strength; converging lines indicate protrusion of an object. Not only can the contour sideline be drawn out but also the reference proportions. Thickness can be expressed with modifying lines.

The subsequent research of Kennedy (1984) justifies the developmental stages summarized above through reactions of the sighted. Research shows that Stages Four, Five and Six are comparatively unpredictable than Stages One, Two and Three. Nonetheless, Kennedy believes that similar instability also exists in related research on spatial representation developmental stages of the sighted. Due to the fact that sighted children identify with the sequence of the stages, Kennedy claims that the six developmental stages can be applied to the drawing representation stage of sighted children. Kennedy thus proposes the discourse as follows: tactile sense can replace visual sense and the former enables the blind to draw common depth cues frequently used by the sighted. However as the 1983 research shows, the two claims above fail to explain such important details as visual deficiencies, education, topic content and drawing methods.

In addition to research on spatial developmental stages, Kennedy's numerous researches on the blind's ability to express monocular static depth cues continue to justify the discourse mentioned above. He discovers that a congenitally blind with no drawing experience and observation (no light sense after 16 years of age) is able to draw a trapezoidal surface and the

two converging legs of the table in the near end. The two legs of the table converge to the top and merge into one point high up. Several adults who are totally blind with and without light sense can represent oblique surface leaning toward the far end with convergent lines. They can also use thick and thin boundary lines to differentiate far and near (Kennedy, 1983). Moreover, the use of convergence among the blind of different regions (Kennedy, 1993) has considerable correlation with relative distance.

A recent study conducted by Kennedy (2003) shows that a 12-year-old blind girl, Gaia, who lost her sight at a young age, is able to adopt such spatial representation strategies as partially occlusion, parallel projection and inverse projections. Another case (Kennedy & Juricevic, 2003) is a 40-year-old woman, Tracy, who lost sight early in life. She is able to draw near oblique projection cubes. Tracy can also use size to represent far and near and up-down left-right precise relative positions often used by the sighted to represent different objects in space. The latest study of Kennedy (Kennedy & Juricevic, 2006) shows that a totally blind 47-year-old male, Esref, can adopt such spatial representation strategies used by the sighted as foreshortening, parallel projection and front-back covering. According to the above studies, Kennedy and some other scholars (Kennedy 2003, 1993, 1984, 1983, 1980; Kennedy & Juricevic, 2003) claim that tactile sense can offer the same spatial principles to allow the blind to have intuitive comprehension perspective and draw planes to represent three-dimensionality.

Tactile Sense Fails to Replace Visual Sense

Researchers who argue against the above studies discover that with strict exclusion of visual experience and visual condition, no matter if the blind draws a simple cube, a cylinder, or even a complex polyhedron, the final developmental stage of a blind differs much from that of the sighted (Hiroshi, 1955, cited in Yasumasa, 1983; Shiu, 1999; I & Shiu, 2001). Moreover, the totally blind cannot comprehend advanced projection system from tactile pictorial drawings.

The studies conducted by Shiu (I & Shiu, 2001; Shiu, 1999) classified 108 drawings into different categories. The drawing assignments include simple geometric objects, partially covered objects sketch, spatial imagination and portraits. The researchers discover that excluding any visual experience, the spatial representation development of the totally blind with no light sense has five stages: (1) disordered non-differentiation space, (2) local feature representation, (3) climax of differentiation, (4) refinement and (5) unity of the whole. With tactile sense alone, the sequence of differentiation and refinement of spatial representation development is similar to what I (1995) proposes of the spatial representation development trend of sighted children. However, representation strategies, developmental final stage, development pace and routes are all different.

The representation feature of the fifth stage, ~~"u~~nity of the whole", is the entire spatial relationship going toward reasonable unity, which allows different viewpoints to be in

conformity with one another. An obvious and reasonable direction, length and concept of proportion are in existence. Heading towards a simple representation, the drawing lacks details, leaving only the most typical and basic features to represent a complete structure. In the overlapping assignment, two objects are correctly linked in the drawing. Although a base line is beyond limitation, a representation of two objects standing on the same surface facing the observer is achieved. In this stage some participants continue to use transparent overlapping drawing to replace partial occlusion to retain the complete form of the object. Due to the visual deficiency, representation of spatial relationship among objects of the totally blind is yet to be fully developed. The blind still use individual geometric objects representation in the intelligent realism stage of the sighted, and not the visual realism stage. Meanwhile, the representative characteristics shown in Kennedy's last three stages, i.e. ―vantage point", ―metaphorical drawing" and ―illustration drawing," cannot be found in the picture. Factors that contribute to the disparity may include different visual conditions, age, assignment content, etc.

In addition, I and Shiu (I & Shiu, 2001; Shiu, 1999) also claim that non-visual experience participants prefer such spatial representation strategies as ―mixed viewpoints", ―unconnected local features", ―connected local features" and ―ideal viewpoint". The first three may appear simultaneously, consisting of the common representation features in the second to fourth stages. ―Ideal view point" appears steadily in the fifth stage. When it

comes to the representation of an individual object, orthographic projection is adopted. In terms of cubic representation, orthographic projection is commonly used by 7-year-old sighted people. However a more advanced projection system will replace the system when participants reach age 7 years and older. Apparently between tactile sense and visual sense, only partial object depth information can be shared.

The Influence of Education and Learning

However, scholars have later discovered: faint light sense or visual experience early in life and education will benefit the congenitally blind's drawing representation. I and Shiu (2001) discover: through education, a congenitally blind with no light sense can interpret square cubes drawn by adoption of oblique projection in his observation assignment. The researchers explicitly conclude that the outstanding blind participant is putting himself in the shoes of the sighted. His performance outshines all other participants. Hiroshi also discovers that 17-to-28 year-old congenitally blind people cannot comprehend the perspective projection of the sighted. Yet if visual image principles were taught in the first place, (e.g., a circle turns into an oval, a square turns into a trapezoid) the congenitally blind can completely answer what models the sighted has drawn (Hiroshi, 1955, cited in Yasumasa, 1983). In addition, many of the outstanding participants (e.g., Gaia, Tracy and Esref) in Kennedy's research have a great passion for drawing and have acquired much knowledge

about drawing strategies and projection system principles used by the sighted. The above cases indicate that learning plays a crucial role in the totally blind's spatial representation.

Heller (2002) believes that the blind possesses sharp art identification abilities. However, their comprehension may not be the same as that of the sighted. The congenitally blind are slow in development in terms of Piaget's theory, i.e., in retaining numbers and volumes. Without special tactile experience learning, their spatial concept of direction and position will be fairly vague (Cahill, Linehan, McCarthy, Boremans & Engelen, 1996; Thomas & Evelyn, 1997). Dulin also believes that tactile drawing comprehension is not inborn. Projection principles of the learning drawings, the optimization of touch and haptic exploration processes must all complement with tactual pictures when learning to draw (Dulin, 2007). The congenitally blind and blind children who lose their sight early in life are slow in their spatial development. Such can be improved through tactual drawing education (Dunlin, 2007; Dunlin & Hatwell, 2006). The above studies all justify the importance of education in spatial representation development.

Conclusion

The disparity that lies in the drawing development theory is a set fact. Whether ~~–t~~actile sense can replace visual sense to provide enough visual information" is still under much debate. If the above questions can be answered, then such gaps can be bridged. Do

remnant faint sense and visual experience early in life play an important role in the totally blind's spatial representation development? How have education and learning changed the totally blind's spatial representation? These are issues yet to be clarified.

In view of the above, this paper aims to achieve the following goals:

a. Compare the spatial representation development differences among totally blind with different visual conditions.
b. Discuss the possible influence of education on the spatial representation development of the totally blind.

It is to clarify the influence of visual condition and education on the totally blind's spatial representation development. In addition, observations of the totally blind aged 18 and older is attached, including the influence of different stimulus.

Methodology

Participants

Due to the fact that visual conditions are strictly controlled in this research, multi-handicapped blind people are excluded in order to reduce the interference of unknown factors. For that reason, participant who comply with all set conditions are few. The 11 high school participants all come from a school for the visually impaired in Taipei. The school is the only one in Northern Taiwan. Almost all the students who meet the criteria

have participated in the research. However, some of the blind were excluded from our research because they attended regular schools and were scattered in different places. The five college students all come from the university of Taipei Resource Center for the Visual Impairment. All participants agreed to join voluntarily. According to different visual conditions, they are classified into the following: congenitally with no light sense (six persons), congenitally blind with light sense (five persons) and acquired totally blind (five persons) (See Table 1).

Instruments

Instruments used are drawing tools invented by the researchers, including the clay board and drawing pencils that enable the blind to touch-read instantly and make revisions easily. The clay board is made of clay specially used for sculpture, which is formed into a tablet of A4 (210 mm. × 297 mm.) in size and 5 mm in thickness. In addition, participants were provided with two different kinds of drawing pencils. The size of the clay tablet is designed to allow participants to draw conveniently the stimulus in 1-1 proportion.

Table 1. Basic information of the participants

Group	Participant ID	Age	# of drawings	Age of vision lost	School/Grade
Congenital total blindness without light perceptions **CB**	CB01	19(19;1)	8	0	College/1st
	CB02	19(18;9)	7	0	School for VI/11
	CB03	19(18;9)	4	0	School for VI/11
	CB04	19(18;8)	3	0	College/1st
	CB05	18(18;1)	5	0	School for VI/12
	CB06	18(17;12)	5	0	School for VI/11
Sub-total	n＝6	M=18.6 (18;06)	32	0	
Congenital total blindness with light perceptions **LP**	LP01	23(23;3)	5	0	College/2nd
	LP02	22(21;10)	7	0	College/4th
	LP03	20(19;6)	4	0	School for VI/13
	LP04	20(19;6)	5	0	School for VI/10
	LP05	18(17;11)	4	0	School for VI/10
Sub-total	n＝5	M=20.6 (20;4)	25	0	
Acquired blindness **AB**	AB01	20(19;10)	6	Congenital glaucoma at the age of 1; total blindness at the age of 14	College/2nd
	AB02	19(18;10)	6	Past visual impairment on the right eye; total blindness at the age of 10	School for VI/11
	AB03	19(18;9)	4	Past visual impairment; total blindness at the age of 12	School for VI/11
	AB04	19(18;6)	7	Past visual impairment; total blindness at the age of 11	School for VI/12

	AB05	19(18;6)	11	Congenital retina pathology; total blindness at the age of 10	School for VI/11
subtotal	n＝5	M= 19.2(18;10)	27		
Total	N＝16				

*Note: the numbers in the age column represent the participant's AGE (YEAR; MONTH). For example, “19 (18; 10)” means the participant's age is 19 after rounding, and the actual age is 18 years and 10 months. The "M" value represents the mean age of each group.

Stimulus

In current studies of drawings by the blind, simple geometric forms, tables and house models are often used as stimulus. In this research, we have adopted stimuli with a rather complex form. The stimuli can be classified into two: models of the same size (including apples, carambola, green pepper, mugs and balls) and models of a shrinking size (including pipe organs, buildings and airplanes).

Procedures

The research process was as follows: (1) Researchers explained the goal of the research and how the drawing assignment was conducted. The participant were given real object models. (2) Researchers provided drawing tools and explained the drawing process and revision. (3) The participants were made familiar with how the tools were utilized. (4) The participants performed the drawing assignment. Clay boards were provided as many as needed by participants. The assignment was conducted with much flexibility on the basis of

participants' performance. If participants thought that the task was difficult, then the level would be decreased by replacing with a lower-level model. If the opposite was true, the level of the assignment would be increased and a complex model would be offered. There were no time limits. If participants expressed little interest and intention in drawing, the research would be terminated. The entire process was videotaped using digital cameras and camcorders.

Method of Analysis

Drawings analysis was based on the studies of I and Shiu (2001) and Kennedy (1984) in regard to the spatial representation development of the blind. Researchers served as classifiers. The classification process included: (1) Definition and familiarization with the typical drawing of each stage and a review of the participants' drawing process. (2) Two researchers conducted separate classifications independently. (3) The classification results of the two researchers were compared and the difference in classification was discussed until a consensus was reached. (4) When a difference emerged within the classification, two researchers evaluated participants' spatial representation style again and reviewdd the video recording of the drawing process as a basis for judgment.

Results

The research results contain a total of 84 drawings. After digital image preservation and analysis, we arrive at the results as follows:

Speculation of the Two Spatial Representation Development

Taking the spatial representation development of I and Shiu (2001) as basis, participants' drawings are roughly in the fourth and fifth stages. Nine participants even exceeded the ~~u~~nity as a whole" (fifth stage), including the congenitally blind with no light sense (one person), congenitally blind with light sense (three persons) and acquired totally blind (five persons). Only one congenitally blind with no light sense appears in Stage Four. The results of the study are mostly in the fourth and fifth stages. No single participant lags behind Stages One to Three. Moreover, some of them exceeded Stage Five. This phenomenon shows that the totally blind aged 18 years and older can keep on improving spatial representation. As far as spatial representation features are concerned, the connection between the relative position and the object segments comes into the picture in Stage Four. In Stage Five the object segments display a reasonable spatial representation. In addition, due to the rise of the difficulty level in the object form, drawings of the totally blind show a more exquisite representation such as detailed descriptions of the use of oblique lines, surface protrusion and texture. This presentation strategy does not emerge in the

simple geometric object assignments of the totally blind aged under 18 in I and Shiu's research (I & Shiu, 2001).

Take Kennedy's six-stage (Kennedy, 1984) discourse as an example. Two totally blind with no light sense appear in Stage Three. Two acquired totally blind appear in Stage Four. Four congenitally blind with no light sense, five congenitally blind with light sense and three acquired totally blind appear in Stage Six. Results show that the congenitally blind (with or without light sense) does not represent objects by using the "vantage point" of Stage Four. Stage Four spatial representation is similar to that of Luquet's visual realism, which is merely adopted by the acquired totally blind. Visual experience is the determining factor that contributes to the difference. In addition, the "illustration drawing" of the final stage was achieved by 12 participants with different visual conditions. Stage Five does not come into picture.

In summary, participants of the research mostly scatter among the fourth and fifth stages defined by I and Shiu (2001), which shows that a sequence order exists between these two stages. Three totally-blind groups of different visual conditions all entered the fifth stage, which shows that the classification is also suitable for the totally blind of different visual conditions. When the assignment difficulty level is heightened and participants' age limit is extended to 18 years and older, three groups of participants all drew spatial representation features that exceed what is in Stage Five. This shows that the definition of the spatial

representation in the fifth stage can be extended further. However, analyzing with Kennedy's six-stage discourse (Kennedy, 1984), only stages three, four and six emerged. The development sequence order is not consistent as that of the previous result. The probability of the emergence of Stage Four has a lot to do with visual experience. Studies show that Kennedy's six-stage theory is not stable, and is liable to intervention by visual condition.

Representation Features

As far as representation features are concerned, in the third and fourth stages of each assignment, simple lines or forms are commonly used to represent an object. For instance, in the carambola assignment, we observe that the totally blind stresses more the crest line description of a carambola. Line combination of different length is used to represent carambola as well. The typical examples are CB02 (18; 9), LP04 (19; 6), LP02 (21; 10) (See Figure 1-4). Comparing with the drawing development of the sighted, such presentation strategy is similar with what Golomb (1992) describes as ~~–e~~onsisting of global units". Golomb indicates that sighted children will represent animal and human subject drawings by using a surface feature combination. For example, the combination of a vertical line and many horizontal lines on top is to represent a giraffe. A near circle with spiral short lines on its rim and two small circles within the circle are to represent a kitten.

Such eerie and unique combination of circles, lines and dots are not part of the existing sensual mode. Instead, the children invented the representation system themselves (Golomb, 1992). The strategy is a representation of a 3-year-old sighted, but is often adopted by the congenitally blind with and without light sense aged 18 to 21 years and 10 month old. The difference resulting from lack of visual experience is evident here.

Figure 1.
CB02 (18; 9), the first drawing of a green pepper by CB02.

Figure 2.
CB02 (18; 9), the second drawing of a green pepper by CB02.

Figure 3.
LP04 (19; 6), drawing of a carambola.

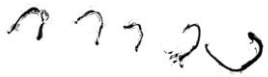

Figure 4.
LP02 (21; 10), drawing of a carambola.

Complexity of the Stimulus: Taking the airplane assignment as an example

Regarding the formal complexity of an object, when the form is rather simple in nature, the congenitally blind with no light sense will use single round mass or a closed or round curve to represent the object. When the form is rather complex, sometimes they will place respective features of the object in the drawing separately (See Figure 1, 2 and 5), with each having no correlations with the others. In the representation of object features, the congenitally blind with light sense display much exquisite description of details (See Figures

6 and 7). When it comes to a more complex object, most of them can connect different features into one single object. However, a few fail to establish the relationship among different features. They place such features in perpendicular or parallel order to represent respective features in the drawing (See Figures 3 and 4). The phenomenon shows that when faced with an object with more complex features, before finding reasonable connection strategies among different elements, some congenitally blind with and without light sense will adopt layer representation to represent the object. In addition, the acquired totally blind's spatial representation far exceeds the above two groups, especially in expressing the difference among different features. Moreover, acquired blindness (AB) did best among the three groups in the spatial connection. Comparing with the other two groups, they often use accurate proportional closed contour to represent object segments (See Figures 9-12). Thus, they can represent the difference of an object using different forms. The above phenomenon shows that visual condition has great influence on spatial representation.

Figure 5.
CB01 (19; 01), drawing of an airplane.

Figure 6.
LP02 (21; 10), drawing of an airplane.

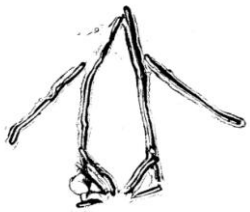

Figure 7.
LP01 (23; 03), drawing of an airplane.

Figure 8.
AB01 (19; 10), drawing of an airplane.

Projection System

As far as projection system is concerned, no linear perspective has been adopted in the drawing results. Of all the 84 drawing assignments of the totally blind, only 3 acquired totally blind adopted the oblique projection system to represent glasses (AB04, 18; 06) (See Figure 9), apples (AB03, 18; 9) (See Figure 10) and green peppers (AB01, 19; 10) (See Figure 11). One acquired totally blind adopted near oblique projection to represent a mug (AB03, 18; 9) (See Figure 12). The other 80 drawings show no intention of representing using near oblique projection or oblique projection, or even, the perspective projection system. Not one of the congenitally blind—with or without light sense—shows near oblique, oblique projection or perspective. The phenomenon shows that past visual experience seems to be the determining factor of whether near oblique or oblique projection come into play. The congenitally blind do not naturally develop perspective. Such a finding concurs with those of I and Shiu (2001).

Figure 9.
AB04 (18; 6), a mug.

Figure 10.
AB03 (18; 9), an apple.

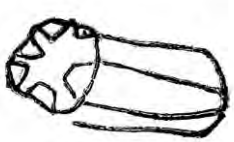

Figure 11.
AB 01(19; 10), a green pepper.

Figure 12.
AB03 (18; 9), a mug.

Education, Drawing Experience and Motivation

The study discovered that education, drawing experience and individual's learning attitude have a huge influence on the blind's spatial representation. In the group of congenitally blind with light sense, LP01 (23; 03) encountered a mathematics teacher in junior high school where he was taught trigonometric function and different mental rotation of the object in three dimension through numerous raising line drawings. Therefore, LP01 could precisely draw the orthographic projection of every object and orthographic projection after object rotation. Moreover, he expressed his strong intention to represent object depth. For instance, he attempts to use a curve or oblique lines to express thickness. Although after many attempts he still failed to draw the stimulus of oblique projection, his performance was well beyond the spatial representation of the following case, CB04.

In the group of congenitally blind with no light sense, CB04 (18; 08) has been taught with the notion that ―a blind does not need to learn how to draw and he or she does not know how to draw". Therefore she puts great time and effort in learning languages (French) and music (piano). When asked to draw, she felt much troubled. She said drawing three-dimensional objects on a two-dimensional plane is mission impossible. Although the researchers kept encouraging her for as long as eight hours, CB04 still rejected to try out a different way of drawing. She always used the simplest orthographic projection and unchanged pan-circle to represent pan-sphere stimuli (e.g., apples, peaches, bells). When

confronting different stimuli, she rejected to give any answer. She showed no intention of representing depth and no interest in drawing.

The other five congenitally blind with no light sense had little experience in drawing. They expressed their difficulties at the beginning, but with researchers' encouragement they gradually discovered solutions to their assigned topics and developed more confidence in drawing. This example shows how important education is.

In the group of the acquired totally blind, two individuals stood out from the rest. AB01 (19; 10) took a positive learning attitude when faced with challenges. AB04 (18; 06) had a great passion for and much experience in drawing before becoming blind. That explains the reason why the two performed better than the rest.

AB01 (19; 10) kept a high interest and strong motivation in the entire drawing process. When researchers gradually raised the difficulties of the assignments, he could always complete the task fast and with much confidence. The lines he drew were so smooth that it was hard to believe it was his first drawing task. When AB01 was drawing the pipe organ, he did mention his experience of touching a pipe organ before. He hoped that one day he could play the pipe organ at the church. That is why he was able to draw the pedals that were not shown in the model (See Figure 10). When researchers asked him to draw a dog with an iron leash, he mentioned his liking for mastiffs. In his childhood there were many mastiffs to play with him in his grandfather's house. Under the request of the researchers,

he drew the mastiff by memory – one with a pair of long-standing ears and furs and long nose (See Figure 13). From his drawings we can observe that AB01 can accurately express the spatial representation relationship of the object and further express his observations and inclinations toward subjects based on his own life experience. Besides his faint visual experience, both the motivation in drawing and positive attitude contributed to his performance.

Figure 13.
AB01 (20; 10), he drew the pipe organs (left), and the mastiff by memory (right).

The other individual, AB04, loved drawing before he lost his eyesight, but stopped drawing after he became blind. When researchers asked him to draw, he pleasantly inquired where to buy related material to continue drawing. His speed in drawing was fast and he could use oblique projection system to represent a mug. When researchers asked him to draw a human subject, he mentioned his passion for the cartoon ―Dragon Ball" before becoming blind. Eventually he relied upon his past visual memory to quickly draw the comic figures he saw in childhood. Such a result shows the influence of visual and drawing

experience before losing one's eyesight (See Figure 14).

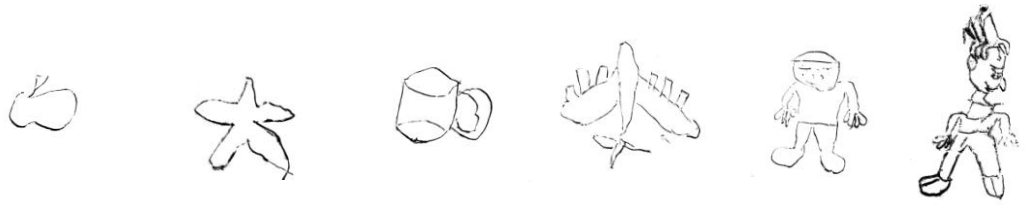

Figure 14.
AB04 (18; 06), he drew an apple, a carambola, a mug, an airplane, a person and the cartoon character ―Dragon Ball".

From the cases above we can conclude that education, motivation and past visual and drawing experiences before losing sight can all enhance spatial representation of the blind.

Discussions

From a developmental perspective, we have a rather pessimistic finding for the spatial representation development of the totally blind. With strict exclusion of any visual experience, we still fail to justify that tactile sense can replace visual sense and acquire enough or similar pictorial information. Therefore, visual condition apparently contributes to difference in spatial representation.

However, while we overturn Kennedy's rather optimistic views toward the development, two reasons can still explain the different results of the two studies with the exclusion of the major influence sight has on the issue of participants. (1) The disparity between the two studies results from difference in learning and motivation. (2) The research subjects of

Kennedy's are exceptional. Thanks to the special congenital conditions, they possess excellent spatial representation skills. Their accomplishments cannot represent the totally blind in a universal sense.

The first suggests the influence of environment and indicated the importance of education and learning. Besides individual development, there is much room for improvement in terms of the blind's spatial representation. Participants of the research, along with those of I and Shiu's study (I & Shiu, 2001), hardly ever had any chance for drawing. Western societies pay more respect to the blind and have abundant resources on pictorial learning. Family and school education shows a supportive and encouraging attitude toward the blind. The individual's personal interest and motivation also differs from person to person. Such external influences may explain the reason why the totally blind in this study failed to develop perspective.

In the Taiwanese education for the visually impaired, subjects that rely upon hearing such as music is emphasized. Art-related courses are often categorized as visually-related and are often neglected. Most teachers and parents are unclear about and do not pay much attention to tactual art sense and the related representational experience. Even in formal special education, sculpture, raising line drawing, printmaking and ceramic art are not offered to students. However, the most crucial goal of education for the blind is to shorten the gap between the sighted and the visually impaired. It is best for the blind to acquire as much

experience as possible, but it must not preclude the possibility of pictorial creation and communication.

We believe that visual condition is the key to what projection system the blind adopts to represent space. Furthermore, education can definitely enhance individuals' motivation of representation and presentation strategy. However, whether education can help the blind of different visual conditions to attain the perspective or oblique projection as mentioned in Kennedy's research is yet to be determined. This issue obviously requires more research and effort. After all, the perspective image of an object comes from the projection of the retina. When three-dimensionality is projected into two-dimensionality, except for some specific angles, the transformation usually distorts all physical features of the object (e.g., size and angle). Whether education can teach the blind to comprehend such distortion through tactile sense and represent the distortion have yet to be proven. However from an educator's perspective, Kennedy's finding is still quite encouraging, for such a discovery makes us take an optimistic attitude toward art education for the blind.

To sum up, the spatial representation development of the totally blind, aged 18 years and older, is still in progress. The drawing representation strategies and developmental stages of the blind and the sighted share some common characteristics. Such similarities can only justify the fact that visual experience is not a necessary condition for drawing representation. However, differences in individual visual conditions and experiences all contribute to the

great disparity in the final development of spatial representation, developmental speed and representation strategies. They result in the disparity of the pictorial features between the sighted and the blind. Individual drawing experiences and personal motivations will help close the gap. Therefore, educators of the blind, art educators, parents and the blind themselves should take a more open-minded and positive attitude toward pictorial art education.

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A Comparative Study of Curriculum Policies and Practices in Arts Education in Hong Kong and Taiwan in the 21st Century

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Abstract

At the turn of the 21st century, the governments of Hong Kong and Taiwan initiated curriculum reforms, which aimed to expand children's arts experience, develop their generic skills and connect their knowledge in and through the arts. In Taiwan, the arts curriculum adopts an integrated design while in Hong Kong, it adopts an integrative learning approach that connects not only the arts, but also other Key Learning Areas. Working with tertiary institutions, the Taiwanese Government has provided an advisory group and other resources to prepare teachers for an integrated arts curriculum. Although the Hong Kong Government co-organised projects with tertiary institutions and the community, and commissioned a professional development course for primary school teachers, secondary school teachers seemed to be neglected. This paper compares official curriculum frameworks and their implementation, primary textbooks and teacher preparation among the two programmes. Many challenges are identified, and recommendations, such as increased collaboration among stakeholders and research on various integration approaches, are offered. It is hoped that these recommendations will help the successful implementation of the integrative /integrated arts curriculum in both places, as well as other parts of the world.

Introduction

At the turn of the 21st century, many countries began to review and reform their education policies in order to equip children with the necessary breadth and depth of knowledge, skills, and attitudes to meet challenges in the new millennium. The governments of Hong Kong Special Administrative Region (HK) and Taiwan, Republic of China (Taiwan) also aim to prepare all-round citizens for the new century by reforming the school curriculum, including the arts curriculum by expanding students' arts experience, developing their generic skills and life-long learning attitudes, and connecting knowledge in and through the arts. In the 20th century, music and visual arts (VA) were the only arts subjects taught in HK and Taiwan schools, and they were taught separately. The new policy in HK advocated an integrative arts curriculum, whereby music and VA have separate curriculum guidelines, and teachers are encouraged to integrate other arts elements into their teaching and to link the arts education key learning area (KLA) with other KLAs of the curriculum. In Taiwan, a truly integrated arts education policy is recommended, which integrates music and VA with other performing arts, i.e., dance and drama. Music and arts teachers are expected to design new curriculum content that assimilates all the arts. Before doing the comparative study, the arts education policies and practices are reviewed.

Review of Arts Education Policies and Practices

In 2004, a comprehensive survey of selected arts-rich programmes in over 35 countries from around the world was conducted by Bamford (2006). Some findings from her investigation on the impact of the arts in education are significant to this study:

1. The arts appear in the educational policy in almost every country in the world. This is particularly true during the turn of the Century, when many countries started to revise their educational policies and curriculum to prepare students for the fast changing world. To develop all round citizens, many countries have included the art subjects in their core curriculum, e.g., in Australia (AEC, 1994a), USA (MENC, 1994), United Kingdom (DFE, 1992), China (Guo, 2009) and New Zealand (MOE, 1999).
2. "Arts education" is culture- and context-specific, which gives emphasis on the arts as cultural agents, and teachers as facilitators, bringing children to discern and value their own arts. Yang (2003) argued the different values of arts education, from aesthetic, expressive, intellectual to the sustainability of the cultural arts. She emphasised that integrated arts education relates closely to students' daily encounter and connects well with their whole person development. Hwang (2003) acknowledged the open and multifaceted arts culture in Taiwanese society, and further reinforced the core culture as one's fundamental value to promote the multifaceted arts curriculum. Through analysis, critical evaluation, construction and recognition of one's core culture with other cultures, students could connect the arts with their daily life, preserve cultural heritage and interact with other cultures creatively.
3. There is a difference between education in the arts and education through the arts. The former maintains learning in each of the art forms to make improvement, enhance cultural identity and a sense of personal satisfaction. The latter utilises different artistic strategies to teach other curricula in order to enhance the overall achievement, reduce school dissatisfaction and promote positive knowledge transfer in quality arts programmes. Bresler (2005) argued the cognitive advantages of the arts and their

capacities to connect to other areas of human endeavors with evidences from Norway, Greece, Australia, Japan and the United States.

4. Quality arts education is inclined to have a strong partnership between the school, outside artists /arts organisations and the community. Schools were less bound by their physical walls, but had become centres connecting children to a range of arts enhancement venues such as museums, concert halls and the wider community. Almost every quality arts-rich education programme in Bamford's study (2006) highlighted the importance of partnerships and the significance of working closely with the local community. Many schools had extended the classroom boundaries to include art and cultural institutions. About 87% of countries acknowledged that arts education had improved community bonds. In HK, the experience that teachers gained in designing their lessons or co-teaching with the artists in class resulted in considerable professional development for both the artist and the teacher (Bamford, 2006).

Purpose of Study

Although both HK and Taiwan have similar ethnic and cultural backgrounds, they employ different strategies in promoting arts education. It would be interesting and vital to find out what these policies and curriculum content are and how they are conducted in order to make improvement on curriculum designs and practices. Hence a comparative study of arts education on four foci was conducted: the curriculum policies, teaching and learning practices, classroom materials and teacher preparation. The purpose of using comparative study method was because through careful investigation of the integrative/integrated arts curriculum in HK and Taiwan respectively, the benefits and problems will be revealed and

compared. Moreover, new insights will be elicited, which may be of value and interest to policy makers, educators, researchers and practitioners in both places as well as in other parts of the world. *"Integrative"* arts curriculum is used in HK to maintain a stronger emphasis on one art form while integrating with other art forms, while *"integrated"* arts curriculum is used in Taiwan to integrate music, VA and other arts such as dance and drama.

Review of Comparative Education

Comparative educational studies have enabled educators and researchers to examine different countries' educational policies and teaching, learning and assessment practices objectively through an analysis of official documents or different teaching, learning and assessment practices. Noah (1986) identified four dimensions of methodological spectra in comparative educational studies. These included i) *purpose*: whether it was descriptive, analytical or explanatory, ii) *scale*: whether it was of one country, a few countries or many countries, iii) *paradigm*: whether it was formalised or less formalised, and iv) *methods and data*: whether it was quantitative, qualitative or a mixture of both. Although Kemp and Lepherd (1992) argued the lack of theoretical development in comparative music education, Lepherd (1988) adapted Bereday's comparison methods in his study of music education in the People's Republic of China. In Bereday's (1966) comparative method in education, four steps of comparative analysis were employed: i) description: descriptive data presented with the aids of tables and diagrams etc., ii) interpretation: written account with educational facts and interpretation, iii) juxtaposition: setting up differences and similarities, and iv) comparison proper: a simultaneous comparison. Chu and Kennedy (2005) conducted a focused comparative study of 5th-grade integrated arts textbooks in Taiwan and the USA. They used

four educators' curricular integration paradigms to investigate the proportion of music versus other disciplines included in the textbooks. Phillips (Alexander et al., 2000) argued that comparativists were capable of constructing an analysis that explained the phenomena in an intricate education context, hence they were able to anticipate and assess the possibilities those phenomena brought about for other settings. If one of the aims of policy makers and teachers is to transform education, then comparative studies, as described above, may offer us diverse models and strategies to transform education.

Alexander (2000) also conducted a large scale international study of primary education in England, France, India, Russia and the United States from 1994-98. It focused on six areas: i) structure and purposes of primary education, ii) nature of teaching and teacher thinking, iii) classroom experience encountered by pupils, iv) classroom language, v) relationship between the classroom and educational and social policy, and vi) impact of culture and history on education. Three institutional communities were compared: the *system*, the *school* and the *classroom*, emphasising the interpretative rather than the regulatory aspect of pedagogy.

Alexander (2000) emphasised the ways teaching and learning practice related to the context of culture, structure, and policy in which it was embedded. Actual teaching and learning practices could only be understood through the complex interplay of policies, structure, cultures, and values. The systematic comparison of universal pedagogical elements across different countries versus those specific to a particular country or culture can allow us to illustrate the possibilities and limitations of different teaching practices and policies.

Methodology

The above literature on comparative study provides the theoretical framework for our investigation of the curriculum policies and practices in arts education in HK and Taiwan. Several research questions are raised to assist the investigation:

1. What are the aims, objectives and curricular frameworks of arts education in the official documents?
2. How is arts education being conducted?
3. Do the practices match the intended policies?
4. How do the classroom materials such as textbooks help to implement the curriculum?
5. What courses and support do pre- and in-service teachers get in teacher education institutions?
6. What are the problems facing them in implementing the new curriculum?

We referenced Noah's methodological spectra (1986) for investigation: i) official documents on arts policies and curriculum guides stating the rationale of arts education reform were examined and compared in the two places, ii) some exemplars from the "arts-in-education" programme, which involved artists working with school teachers in the formal curriculum, were cited and assessed to illustrate the actual implementation and identify problems of the integrative arts curriculum in HK. Teachers' schedule of work, lesson plan contest, useful websites, workshops and conferences are explored in Taiwan, iii) adapting Alexander's (2000) three levels of *institutional community*, both the *system* and *classroom* were compared, with a third level being the *hardware-software provision,* instead of comparing *school*. For *hardware provision,* primary 4 & 6 music (HK) and arts (Taiwan) textbooks were analysed and compared, which included the rationale and focus of textbooks,

the structure and framework, thematic content, proportion of arts integration and assistance aids for teachers. For *software provision,* both pre- and in-service teachers' professional development was compared, with related research in two teacher education institutions. Similarities, differences and problems of implementing arts education are compared and explained; challenges facing the reforms are discussed with recommendations proposed. We have chosen curricular organizational frameworks, implementation of arts education projects, teacher preparation and textbooks review as areas of comparison

Data Analysis

Overall Aims and Organisational Frameworks of Arts Education

Hong Kong. At the start of the new millennium, the Education Commission in HK undertook a comprehensive review of education. It declared that children should achieve holistic development in ethics, intellect, physique, social skills and aesthetics, be capable of life-long learning, adapt to change, and develop the potentials to contribute to the future well-being of the nation and worldwide (EC, 2000, p. 4). The arts education curriculum guide asserts that arts education contributes significantly to children's aesthetic and whole-person development, creative and critical thinking, cultural awareness and effective communication (CDC, 2002, p.3; CDC, 2001, p.18). The music curriculum guide, which follows closely the aims and frameworks of the arts education curriculum guide, was introduced a year later in 2003.

In order to facilitate coherent learning, all subjects are grouped into eight KLAs (CDC, 2002). Strategies for developing the Education Department, the KLAs and teachers in three stages with short-term (2001-2006), medium-term (2006-2011) and long-term goals (beyond

2011) are suggested. The nine-year compulsory education from primary 1 to secondary 3 (grade 1 to 9) is grouped into three key stages (KS): KS1 (primary 1 to 3), KS2 (primary 4 to 6) and KS3 (secondary 1 to 3). Some changes in curriculum planning and implementation are proposed by introducing i) a diversified arts curriculum (CDC, 2002, p. 4), which includes learning other arts (p. 52), life-wide learning refers to learning in real contexts and authentic settings, i.e. attending a live concert instead of listening to a recording of it during a lesson, ii) a range of pedagogical approaches, including integrative learning and life-wide learning in the arts (pp. 5, 52), and iii) connection within the arts education KLA and also with other KLAs.

About 10-15% and 8-10% of the lesson time is recommended for arts education at the primary and junior secondary levels, respectively. A flexible curricular structure is also recommended to accommodate formal, informal, modular, integrative and project learning. Some possible adaptations such as artist-in-school programmes, introducing drama and media arts and adopting integrative learning approaches and life-wide learning are suggested to broaden students' arts learning experience.

Curriculum design across the arts and interdisciplinary learning across KLAs is thought to encourage students to integrate and connect their learning experiences (CDC, 2002, pp. 52-54). The music curriculum guide (MCG) affirms that by learning across the arts, children would understand similar concepts such as contrast and harmony, as evident across different arts. With this approach it is thought likely that students' conceptual understanding of the arts might be widened, their creativity stimulated, and responses towards music elevated (CDC, 2003a, p. 32). Moreover, the MCG states that integrative learning in the arts is a learning approach, not an integrated arts curriculum, which means music can maintain its integrity

while connecting students' learning with other arts. Learning across the KLAs is intended to extend learning experience laterally, enhance students' motivation to learn, equip them with the ability to examine an issue from different angles, connect different learning experiences, thereby strengthening their understanding of the KLAs. Furthermore, music teachers are invited to work with other KLA teachers to organise activities across the KLAs (CDC, 2003a, pp. 2-33, 62).

Taiwan. In the new millennium, the Ministry of Education (MOE) in Taiwan made reforming the compulsory education curriculum its top priority. In order to meet the needs of national development and public expectations (MOE, 2001, 2003), the reform entailed three issues: i) de-centralisation of the school curriculum, ii) offering alternatives to the discipline-based education, and iii) advocating education for all (Chen, 1999). General curriculum guidelines for grades 1-9 compulsory education were proposed in 1998. The MOE emphasised education as a learning process to help students explore their potential and adapt to the environment. The goals include developing humanitarian attitudes, enhancing integration abilities, fostering indigenous awareness with a global perspective, and developing lifelong learning (MOE, 2001, 2003, p. 3). Traditional subjects are grouped into seven major *learning areas* (LAs), which refer to the content of learning, not the title of school subject. The new curriculum also covers important societal issues such as gender, environmental education, information technology and human rights (MOE, 1998a, 2001, 2003). The MOE conducted a pilot study (1999-2001), before the new curriculum implementation (MOE, 1998b), which focused on school-based curriculum development and integrated teaching approaches (Lai, 2001).

The Arts and Humanities Learning Area includes three art-disciplines: music, visual art and performing arts (dance and drama). For more than fifty years before 2001, music and art were taught separately while dance and drama are new to the school curriculum. The goals of this learning area are to i) foster students' skills and understandings in arts, ii) encourage active participation in arts related activities, iii) enhance the ability in aesthetic criticism and iv) develop artistic potential and well-rounded character in students. Thus, the arts and humanities curriculum enables students to gain knowledge of, and the skills associated with, exploration and expression, aesthetics and comprehension, experience and application in arts (MOE, 2001, 2003, pp. 19-20).

The arts and humanities curriculum guidelines focus on the development of students' abilities in music, visual art, and performing arts, differentiated by grade levels. Four stages of competence indicators are designed to reflect students' abilities upon completion of grades 2, 4, 6, and 9. Teachers are expected to transform these competence indicators into course content, which are not included in the guidelines. Integration and team-teaching approaches are emphasized, so that music teaching is integrated with visual art, dance and drama, and music specialists are teamed with specialists of other art-disciplines, if necessary. To simplify the curriculum at grades 1 and 2, arts and humanities is combined with social studies, and science and technology to become a new course called life curriculum. This reduced the overall learning areas from seven to five for the lower level grades, which not only helps young children to learn, but also makes it easier for school scheduling.

The total lesson time of each learning area is different and flexible, e.g., 28-31 and 32-34 lessons per week are recommended for grades 3-4 and grades 7-8 respectively. About 10-15% of the curricular total lesson time is recommended for arts and humanities at the

primary and junior secondary levels (MOE, 2001, 2003), which is about 3-4 lessons per week. Each lesson is 40 minutes for grades 1-6 and 45 minutes for grades 7-9. The committee of school curriculum development (CSCD) in each school authorized school-based curriculum and scheduling.

Similarities and Differences in Curriculum Frameworks

The review of curricula in HK and Taiwan shows both governments were engaged in promoting a new paradigm for learning and teaching through shifting from over-emphasising academic studies to focusing on the overall whole-person development, from compartmentalising subjects to integrating curriculum into KLAs, and from traditional scheduling to an open, integrated and flexible arrangement of learning time. This is a wide-ranging and ambitious reform. In Taiwan, school subjects are integrated into learning areas, where music and art have become part of the arts and humanities learning area with the performing arts. HK has chosen another route to develop its arts education KLA. Separate music and visual arts curriculum guides were developed (CDC, 2003a, 2003b), which are closely mapped to the aims, framework, and the teaching, learning and assessment plans of the central arts education curriculum guide (CDC, 2002).

The Implemented Arts Curriculum

The Hong Kong scene. Curriculum guides are intended frameworks to be realised through implementation in schools. Until 2003, HK music teachers had been using the 1983 (secondary) and 1987 (primary) music syllabi for curriculum planning. The basic activities were mainly singing, music reading, and listening, while creative sound projects and

movement were considered only supplementary activities. VA and music teachers rarely met to team-teach or develop curriculum. In the new 2002 and 2003 curriculum guides, only a few integrative exemplars are introduced, hence teachers have found it problematic to implement the new integrative arts curriculum through integrating music with other arts to develop students' artistic and generic skills.

Integrative exemplars. The Education and Manpower Bureau (EMB), tertiary institutions and arts organisations recognised the difficulties that teachers faced when implementing the integrative arts curriculum. Joint ventures were organised to encourage teachers to explore innovative and integrative lesson designs and instructional strategies with artists. The "Arts-in-education" (AiE) Programme (2000-2003) involved artists/art organisations working collaboratively with school teachers in the formal curriculum. It aims at i) facilitating partnership between artists and schools to develop an integrative curriculum through the arts, ii) helping students to think and work creatively, and iii) enabling arts and non-arts teachers to collaborate with new and multiple perspectives (HKADC, 2000). The programme consisted of sixteen projects, each with a proactive and a partner school. It was participated by 32 schools, 50 arts organisations, 260 teachers and over 3800 students (HKADC, 2005). The three organisers played different roles: the Hong Kong Arts Development Council (HKADC) administered the programme, the EMB monitored the projects' progress and the Hong Kong Institute of Education (HKIEd) evaluated each project and the overall Programme. In order to understand how the projects were conducted and the learning outcomes, three AiE projects, namely *The dreamcoat of Mount On Shan* (HKADC, 2005, pp. 128-130), *Using Xiqu to develop students' multiple intelligence* (pp. 166-168) and *The rhythm of nature* (pp. 162-163) are outlined below.

Table 1. ***An outline of three AiE projects***

	School X	*School Y*	*School Z*
Project Title	The dreamcoat of Mount On Shan	Using Xiqu to develop students' multiple intelligence	The rhythm of nature
New art form	Musical	Cantonese Opera	Dance
No. of subjects included	7, including music, art and design, design and technology, PE	8, including music, art & craft, languages, PE	6, including music, art and design, maths, languages
Student level	S2 (Grade 8)	P4 (Grade 4)	S1, 2 (Grades 7 & 8)
Project objectives	• Understand how different art forms integrate to produce a musical • Enhance creativity through technology • Utilise technology to facilitate arts making • Develop generic skills	• Experience arts through integrating different subjects • Enhance language learning, multiple intelligence and generic skills • Recognise close relationship between arts and daily life, and enjoy joyful learning	• Develop students' convergent thinking and ways of interpretation • Multiple ways to develop creative thinking • Breakthrough subject separation, develop subject coherence through integration • Develop multiple intelligence
Learning outcomes	• Technology not only assisted creativity and arts making, it also related to culture and daily life • Expanded students' artistic skills, e.g., part-singing, dance and drama • Developed social and personal skills, e.g., communication, decision making • Explored the feeling side	• In-depth under-standing of Xiqu through different disciplines • Performed excerpts from Cantonese Opera both in Eng- lish and Cantonese • Learned moral value from stories • Developed problem-solving, self learning, inter-personal skills • Judged from multi- ple perspectives	• Admired nature, created irregular tessellations to express emotions • Used the methods of integration and interpretation to create own poems • Composed music with lyrics • Choreographed their own music • Aroused interest in learning • Teachers gained new experience
Activities	• Song writing • Paper moulds • Digital photo processing • Props and costumes • Managing backstage • Singing, dance and drama	• Chinese prose and poetry reciting & writing • Xiqu music and instrument playing • Singing , acting with movement • Painted face masks	• Tessellation in VA and maths • Creative poems using contrast, irregular line and progression • Song writing with form and rhythm of lyrics • Creative dance
Characteristics	• Simultaneous workshops to facilitate rehearsals • Virtual art gallery to share creative output & progress with the whole school	• Museum cultural visits	• Students expressed views of nature through creative activities

Problems identified. As a result of the project review, we found the following challenges to occur: i) mental preparation: integration normally involves several subjects and parties, teachers and artists need to prepare for new curriculum and instructional designs (Cheung, 2003), ii) close collaboration*:* parties may not see the importance of joint planning, regular monitoring and reflection, and close teamwork with dedicated time (Cheung, 2005b), iii) school support: this includes not only financial, manpower and parental support, but also arrangements for common scheduling, spacious classrooms, equipment and performance venues, iv) effective communication: appropriate interaction between teachers of different subjects, between teachers and artists, and between artist and students can affect the project outcome (Cheung, 2005a).

The Taiwan scene. Before 2001, the music curriculum content was structured into six categories: theory, music reading, singing, appreciation, composition and instrument playing (Lai, 2003). Due to long established practices in separating the music and art curriculum, music and art teachers protested about the integrated arts curriculum and refused to participate in the pilot study. Despite this, the arts and humanities learning area is part of the grade 1-9 curriculum, hence school teachers and administrators had to follow the four-year (2001-2004) implementation schedule.

Strategies for implementation. The integrated curriculum is new to school teachers and administrators in Taiwan. In order for teachers to plan their integrated curriculum, many schools reserve a working period for arts and humanities teachers to work together. The purpose for these strategies and projects is to help teachers understand what, why, and how to implement the integrated arts curriculum (Lai, 2006). To implement the arts and humanities curriculum, music and art teachers not only lack integrated arts exemplars as references, but

there is also a shortage of drama and dance teachers to teach performing art content. Many music and art teachers are responsible to teach this content. The committee of school curriculum development (CSCD) in each school, formed by the representatives of each learning area, is responsible for the school curriculum plan. Each year the CSCD is required to submit the school-based curriculum to the county education bureau. The school-based curriculum is an integrated curriculum, which not only connects to the arts and humanities but also relates to other learning areas and school activities. The MOE funded many projects and proposed several implementation strategies to support this new curriculum, e.g., the advisory group, lesson plan contest, related web-site, workshops and conferences:

1. An advisory group employs college professors and experienced arts teachers from elementary (primary) and junior high (secondary) schools as consultants to help review school curriculum, solve teachers' problems concerning integrated arts model, lesson planning and team teaching, and to conduct workshops on designing and implementing the integrated unit plan. The group members travel to schools all over the country for regular consultation and conduct workshops in the National Academy for Educational Research Preparatory Office in Taipei County.
2. A lesson plan contest was held annually by the National Taiwan Arts Education Institute (NTAET) for school teachers, due to the great demand for integrated arts models and lesson plans. Many music teachers were not used to preparing written lesson plans for teaching, and they were overwhelmed by designing integrated arts lesson plans. This contest was held from 2001 to 2007, and the winning lesson plans were compiled and published. Recently they are posted on the website of the NTAET.
3. Websites were set up to help teachers implement the new curriculum, such as

"Literature and arts" (http://arts.edu.tw). This website is planned and maintained by a group of arts educators, which provides resources for the teaching of arts and humanities.

4. Workshops and conferences are held frequently, focusing on the integrated curriculum models, team teaching, drama and dance pedagogy, and assessment strategies to help teachers. Conference themes are usually the project findings and the proceedings have become a good resource for teachers.

Problems identified. As a result of reviewing how the integrated arts curriculum is implemented in Taiwan, the following challenges are found:

1. Shortage of drama and dance teachers. There had been no institution that offered drama and dance teaching certificate programmes before, and even now only a few institutions are offering these programmes;
2. Some music teachers are unwilling and lack the skills to implement the integrated arts curriculum;
3. Music teachers are overloaded and lack the interest in teaching other art forms; and
4. Insufficient administrative support for the arts (e.g., manpower, equipment) compared to other learning areas.

Comparing the Implemented Arts Curriculum

Since there are no systematic guidelines on how to implement arts integration, teachers in both HK and Taiwan employ an open, flexible approach. In HK, only a handful of integrative arts exemplars are provided, besides an illustration of thematic approach with music-related activities across different KLAs (CDC, 2003a). In Taiwan, music teachers encounter a drastic

change in designing and implementing the integrated arts, as they have to transform the competence indicators into course content. The Curriculum Development Council in HK states that integrative learning in the arts is a learning approach more than a curriculum design, implying that music and VA teachers can approach their subjects with a broader exposure to other arts. Most Taiwanese schools have helpfully arranged a free period for arts teachers to plan together. Furthermore, the Taiwan MOE has established an advisory group, while contests are organised with best exemplars being published to a wider education community.

The Classroom Materials

In order to investigate how classroom materials help teachers implement the integrative/ integrated curriculum, the content of two sets of primary school textbooks, P4 (grade 4) & P6 (grade 6), from both HK and Taiwan are analysed and compared. Areas of comparison included the rationale and foci of the textbooks, the structure and layout, thematic content and titles, main items, proportion of other arts and other disciplines with music and various teaching and learning assistance.

In Hong Kong, all primary and secondary school textbooks need to be reviewed and approved by the textbook review committee formed by the EMB. In the chosen textbooks published by the Educational Publishing House (Cham-Lai et al., 2006), the rationale is to develop all-round students with subject and generic skills through a more coherence curriculum, which is related to students' daily life. Each year group consists of two textbooks, which are comprised of eight units with three to four lessons in each unit under a common theme. Themes are usually set culturally and closely related to the children's daily life.

Singing and music reading are no longer emphasised in the upper primary; instead, numerous listening activities are introduced to develop musical and aural awareness. Students are encouraged to respond critically and to freely express their feelings towards the music they hear or the drawings they see. This is a significant shift to develop children to be sensitive listeners, proactively responsive, and to articulate their feelings about music and culture. Self and peer assessment of children's own performances are incorporated with formative and summative assessment.

In Taiwan, the arts and humanities textbooks are reviewed and approved by the National Institute for Compilation and Translation. The chosen textbooks published by *Han-lin* Publishing Company (Liu, et al., 2009) follows the arts and humanities curriculum guideline to provide music, VA and drama content. According to the curriculum guidelines, all art forms are equally important. However the materials of music, visual art and drama/dance are not in equally proportion published in the arts and humanities textbooks. Each textbook contains three to four chosen themes. Each thematic unit entails several lessons (ranging from 3 to 6) integrating music, VA and drama. The content is based on the goals of the curriculum and competence indicators. Themes are often taken from daily life subjects such as family, school, neighbourhood, park, season, story, mask and holiday with a limited number of elements of the arts. About 45% of the *Han-lin* textbook content is devoted to music, and drama has the least materials. Many of the integrated materials are dedicated to music appreciation lessons. Selections from operas and musicals are very popular. Students are encouraged to listen critically and respond to music through movement. Some of the drama lessons connect music and drama, and music is used to create a story or as background music. In order to reinforce the cultural aspect, a large number of Taiwanese folk songs,

music by contemporary Taiwanese composers, and music played by local musicians are adapted for inclusion in the textbook.

Comparing the Classroom Materials

Some similarities are found in the classroom materials of both contexts: i) a thematic approach is employed with topics closely related to the children's daily life encounters, ii) the content emphasises music appreciation more than singing, music reading or creating, and recorder playing is usually used to enhance performing, iii) in order to help teachers facilitate the curriculum, teaching packages consisting of a guide book, visual and aural teaching aids, charts and software are provided by the publishers. However, some differences are also identified: the textbooks in HK have a stronger emphasis on music, over 80% of their content, supplemented by other arts media while those in Taiwan are more integrated: music only comprises about 45% of their content. There is a progressive development of musical elements and concept running through the HK textbooks, while music is treated only as part of the arts in the Taiwanese textbooks. Although both textbooks seek to develop children's aural and listening skills, the ones in HK lay an emphasis on children's self and peer assessing abilities, while those in Taiwan promote children's expressive movement in response to music. Generic skills such as collaboration, communication and critical thinking are emphasised in the HK textbooks while native folk songs and contemporary songs composed by local musicians are commonly used in the Taiwanese textbooks. Major characteristics are highlighted below.

Table 2. ***Comparison of Primary 4 & 6 textbooks in HK and Taiwan***

Primary Text Books *(P4 & P6)*	*Educational Publishing House,* ***Hong Kong***	*Han-lin Publishing Company,* ***Taiwan***
Rationale and focus	• In line with the curriculum reform, emphasis is laid on four learning targets of developing creativity, skills and process, critical response and learning in context (CDC, 2003) • Develop both music and generic skills • Relate to students' life experience and interest	• Follow the curriculum guideline, music is integrated with visual art, drama and dance • Develop arts skills and understanding of arts • Develop artistic potential and well-rounded character • Encourage active participation in arts related activities • Relate to students' life experience
Structure and layout	• Each unit consists of 3 to 4 lessons on a common theme • One textbook for each semester, each consists of about four units • Develop children's musical knowledge, concepts and skills spirally • Integrate with related arts and other disciplines	• Integrated arts: music, VA and performing arts. The largest portion of the content is music materials • One textbook for each semester, each consists of 3-4 units, each unit is divided into 3-6 lessons • A thematic approach is used to integrated the content of each unit
Thematic content for upper primary	• Content relate to local context, extend to neighbouring countries and worldwide to broaden children's perspectives • Themes concern daily life, Chinese culture and student interests, e.g., living on earth; the water world; Cantonese Opera as performing arts; stories of HK and creating tomorrow through ICT etc.	• Themes concern daily life, e.g., family, school, neighbourhood, park, season, holiday • Thematic content also includes the elements of the arts, e.g., rhythm, line, gesture, colour • Content integrates other disciplines, e.g., natural science, social studies, language
Main items and arts integration	• Proportion of music activities to other arts and other subjects – P.4 87% music: 9% other arts: 4% other subjects; P.6 92% music: 5% other arts: 3% other subjects. • Music emphasises listening, with some creating and performing activities • Introduce music elements progressively • Develop recorder skills • Self & peer assessing with formative and summative assessments • Project presentation to develop self learning • Integration with other arts includes creative drawing, poem reciting, art appreciation, dance movement, drama and multimedia technology	• Proportion of each art form varies, music has the largest proportion of 45%, partly because the music score takes many pages in the textbook • Music is used to connect other arts form, much of the integrated materials is emphasising music appreciation • Abandon sequential music learning • Develop recorder skills, with diversified tunes • Respond to music through movement • Emphasis on cultural identity, e.g., local folk songs, contemporary Taiwanese music and local musicians

Table 2. ***Comparison of Primary 4 & 6 textbooks in HK and Taiwan (Continued)***

Primary Text Books *(P4 & P6)*	*Educational Publishing House,* ***Hong Kong***	*Han-lin Publishing Company,* ***Taiwan***
Teaching and learning assistance	• Teacher guide book with schemes of work, lesson plans, teaching strategies for musical production and dance, extended activities, model answers • Information of songs, music, composers and cultural background • Website with resource bank, creating software, useful links and references	• Teacher guide book with lesson plans, teaching approaches, related activities, information of composers and cultural background, list of website, useful links and references. • Music chart of selected songs from textbooks, chart of instruments, recorder fingering • AV aids of songs and music

Teacher Empowerment and Teacher Education Provision

Pre-service, in-service courses and research in Hong Kong Institute of Education, Hong Kong. The Cultural and Creative Arts Department of HKIEd provides the largest numbers of music and VA teachers in HK. Several disciplines and complementary study modules such as "Teaching through Arts Infusion", "Integrative Arts" and "Pedagogical approaches to music teaching and learning" in the Bachelor of Education (Honours) programmes have been added or revised to address integrative learning in/through the arts, as stipulated in the Music Curriculum Guide (Curriculum Development Council, 2003a, p. 62). Artists and dancers are invited to broaden students' exposure in other arts. Music students learn various ways to approach integration and to design activities incorporating their teaching subjects with the arts. Non-arts students can also take the integrative arts modules from the complementary study and the General Education domain. Students are encouraged to explore various integrative approaches during their teaching practice in primary and secondary schools. For in-service primary school teachers, two optional modules, amounting to 60 hours, are offered through Government commissioned Profession Development course. They provide opportunities for all teachers to experience dance, drama, music and VA and

explore strategies of integrating in/through the arts. Unfortunately, this course is not commissioned to secondary school teachers and it is not a compulsory course for primary school teachers either, so a lot of teachers do not have the concept and experience about arts integration. The Master in Education (Creative Arts) programme also provides two modules for both music and VA students to explore integrative arts education.

Since integrative learning is a general approach across the curriculum and there are various degrees of integration approaches, the music and VA staff of the Cultural and Creative Arts Department have collaborated in research, exploring different modes and effective approaches of integrative learning (Au, 2005; Cheung, 2005b; Ng, 2005; Yip, 2005; Yuen, 2005). The problems identified in the AiE projects as highlighted on p.13 and findings from other integrative arts projects not only serve to improve teaching and learning in HKIEd, some case studies and lesson plans have also become useful materials for serving teachers (HKADC, 2005; Cheung & Fung, 2008).

Pre-service, in-service courses and research in National Taiwan Normal University, Taiwan. The National Taiwan Normal University (NTNU) was founded in 1946 and its Music Department has become the most prestigious music education institute in Taiwan. Joined by the Art Department, the Music Department has played an important role in promoting the National integrated curriculum. The music faculty has been actively involved in the implementation of, and engagement in many projects, e.g., "Curriculum Design of Arts and Humanities Learning Area", "Strategies of Assessing Arts Learning", and "Arts Education Integrated Curricula in the Schools of Important Nations". Since 2002, the MD has offered "Aesthetics", "Introduction to General Art", "Stage Directing and Performance" and "Choreography" required for teacher certification. Twelve credit hours are added to the

music-teaching certificate programs (Chen, 2003, p. 88). Furthermore, interdisciplinary theory, integrated curriculum design, body movement and technology are emphasised in the undergraduate and graduate music education program. Some empowerment courses and workshops are offered to help in-service music specialists to upgrade their teaching techniques in line with the new curriculum. They were required to receive at least 30 hours of training program by 2004 to promote the teaching of the integrated curriculum (Lai, 2003, p. 174; Lai, 2006). Other institutes also offer courses for in-service teachers to meet new teacher regulations. For example, two universities started an "Arts and Humanities" master degree program in 2006, to meet the new teaching trends. A few intensive drama courses were offered to help in-service teachers.

Comparing Teacher Education and Teacher Empowerment

In our comparative study of the teacher education and teacher empowerment, some similar strategies are found: i) programmes are modified either with added hours (NTNU) or new modules (HKIEd) to empower teachers with new skills and concepts of other arts, ii) research studies are developed on the integrative/integrated curriculum with findings and teaching materials disseminated to schools and the community. However, different approaches are also employed, e.g., in HKIEd, non-arts students can learn the integrative arts through the complementary and General Education modules and artists are invited to conduct workshops to arts and non-arts students. In Taiwan, the Government collaborates with tertiary institutions to set up website and advisory group to assist music and arts teachers. In HK, subsidized in-service professional development is only offered to primary school teachers while in Taiwan, teachers of both sectors have equal opportunities for professional

development.

Discussion

Challenges in Bringing Arts Education Policies into Practices

We have identified several **c**hallenges confronting both HK and Taiwan when implementing the new arts education policies, namely, cultural implications, teacher readiness, pedagogic issues and professional development of teachers.

Cultural implication. Valuing all the arts instead of focusing on one to two art forms is not innovative. The arts curriculum reforms in HK and Taiwan have followed the global trend of acknowledging the role, value, and significance of the arts. In the United States (MENC, 1994) and Australia (AEC, 1994a, 1994b), emphasis is placed not only on individual art forms such as music, dance, drama, VA and media (Australia), but also on interdisciplinary approach and connecting the arts to other core subjects. The purpose embedded in most mandated guidelines is to nurture students to become productive citizens in a democratic society (Drake, 2007), and in HK and Taiwan, the nurturing of all-round citizens is the primary goal.

Integrative/integrated arts curricula initiate a radical approach in HK and even a major education reform in Taiwan, which can only be successfully accomplished through a concerted effort by different stakeholders. The Government should take the leadership role in policy-making and dissemination. Dissemination only to the primary school sector and not throughout the secondary level could not implement the policy successfully. In HK, school-based curriculum is encouraged, but it is generally not easy for arts teachers to convince the school management of the importance of the integrative arts curriculum in

developing children's holistic understanding. In Taiwan, integrated curriculum is a national policy, the Ministry of Education works closely with schools in implementing the new curriculum. However, policies and regulations change frequently, which generates pressure for teachers, administrators and students.

Teacher readiness and pedagogical implication. In HK, the lack of holistic arts knowledge, skills, confidence, time and resources very often prevents music teachers from exploring the integrative arts curriculum. Some advantages of the integrative arts are recognised in the AiE programme, e.g., "learning of one art form can be enhanced through applying artistic concepts and skills developed in another art form to it, enabling students to make connections between the arts", and "interdisciplinary learning across key learning areas enables children to investigate and critique culture through the arts, integrate their learning experiences and gain deeper insights into the subjects they are studying" (CDC, 2003a, p. 54).

However, the success of the projects largely depends on concerted efforts by various parties: external funding for individual schools, artist's expert input, school's administrative support and expert advice from experienced practitioners, professors and policy makers (Cheung, 2008). Without these extra resources, it is hard for arts teachers to conduct the integrative arts curricula.

It is beneficial for HK music and VA teachers to collaborate in team preparation, like their Taiwanese counterparts within a given common time. However, they are often occupied with heavy teaching loads, special room administration and extra-curricular activities during formal and informal hours. Moreover, integrative learning is only one of many initiatives with which they are confronting. Other concerns include integrating composing, listening and

performing in the classroom, school-based curriculum development to meet new learning targets and objectives, developing generic skills and values in curriculum planning, incorporating key tasks such as Information Technology for interactive learning, as well as catering for student diversity.

In Taiwan, it is the first time to implement integrated curriculum. Integration is a brand new concept for music teachers as well as for college professors. They still argue about the benefits and effectiveness of the integrated arts curriculum (NAER, 2005). There are degrees of integration, such as multidisciplinary, interdisciplinary and transdisciplinary (Drakes, 2007) that need exploring and evaluating. However, only a "thematic approach" is adapted in the arts and humanities textbooks. Frequently music materials are used to connect the chosen theme, not to help students understand music concepts of skills. Music content cannot be connected to "themes" unless it is based on musical concepts and processes. Music, like all other arts, has its uniqueness that is best taught through a rigorous, structured curriculum to be grasped fully (Barrett, et al., 1997).

Although the arts teachers in Taiwan will receive supplementary materials in 2011 on curriculum content and teaching strategies (MOE, 2008), music teachers still face with the following challenges at present: i) music is not an independent course, but a part of the arts learning area, ii) music content is not included in the course guidelines; teachers must transform the competence indicators into music content, iii) music content is based on a chosen theme, which is not intended to develop musical concepts, teachers are expected to plan their lessons independently, iv) arts and humanities learning area contains three art forms, teaching time is less than before, consequently students have problems meeting the learning outcomes and v) music teachers are overloaded, because they are frequently

assigned to teach performing arts (Lai, 2001). The shortage of drama and dance teachers remains problematic. Many teachers in Taiwan use Orff or Dalcroze Eurhythmics approaches to teach movement and to cover the drama portion. After conducting the National Assessment of the arts and humanities in Taiwan in March, 2007, assessment has been the most concerning issue for music teachers. How to help students achieve the goals of the integrated arts curriculum and how to improve the concepts and techniques of arts assessment are still the major challenges for teachers (NAER, 2005).

Professional development implication. Drama and dance teachers are new professions for school teachers in Taiwan. The shortage of these teachers is obvious because there were no institutions that offered drama- or dance-teaching certificates before. Besides, only few institutions are offering drama and dance programmes at present. The tradition of placing drama with English and dance with Physical Education is still the practice in HK. Should there be further development of the integrative learning in the arts, implying additional art forms than music and VA, then new resources and structure for tertiary institutions need to be considered before new programmes for pre- and in-service teachers can be developed. Short courses, workshops and seminars, and the sharing of practical experiences are encouraged to allow teachers to be exposed to various degrees of integration in their teaching.

In HK, music and VA teachers in secondary schools lack the opportunity to receive subsidised professional development in the integrative approach. The lack of teaching exemplars, lesson plans and teaching materials mean that the majority of teachers have to rely on trial and error to come to terms with the integrative design and its implementation.

Conclusion

Through examining the curriculum policies and practices of arts education in HK and Taiwan, it has become clear that both governments value the arts and students' connection of knowledge in and through the arts. Governments aim at preparing all-round citizens through expanding students' exposure of the arts, from music and VA to include dance and drama. To achieve this, HK encourages music and VA teachers to include other arts in their subjects through an integrative approach. Some good cases are found from school practices. Unfortunately, with few exemplars, a lack of administrative, manpower, financial support and monitoring systems, it is difficult to know how frequently and effectively music and VA teachers have implemented the policy. The emphasis on school-based curriculum also gives schools a lot of flexibility on deciding whether to implement the integrative curriculum or not. Taiwan has introduced the more drastic change of an integrated arts curriculum of music, VA and performing arts (dance and drama), which has reduced the music content by nearly half. Although the Taiwanese Government has taken a more proactive role through funding research projects, organising workshops, setting up website and an advisory system, many music teachers are not too convinced of the change, and they still find teaching drama and dance problematic.

Learning from their counterpart, the HK government could be more proactive with collaboration and by facilitating schools and teachers to change through setting up websites, lesson plan sharing and conferences while in Taiwan, the integrated curriculum could be implemented in phases in order to slow down the confusion caused by the sudden curriculum changes. In Taiwan, music teachers face the dilemma of achieving the breadth of the arts while forsaking the depth of music. Besides keeping students' basic music standard, they

need explicit help in arts assessments. As the goal of the curriculum reform is to connect knowledge and to provide an all-round education, situation can only be favourable to teachers through reducing their teaching load and expanding lesson time for music.

Joint research projects concerning various integration approaches such as multidisciplinary, interdisciplinary and transdisciplinary curricular will allow educators to explore the limitation and benefits of each approach, and to select the most suitable and effective approach for their students in different school contexts.

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A Mentoring Approach to Enhancing Early Childhood Music Education: A Hong Kong Case Study

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Abstract

Mentoring has long been recognized as an effective approach in the professional development of teachers since it combines career advancement and psychosocial development (Kram, 1988). While a body of mentoring research in music education focusing on professional development exists (Benson, 2008; Conway, 2008; Haack, 2006), there is little evidence that the benefits arising from the process have been recognized or acted upon at the governmental level. Through the collection and analysis of quantitative and qualitative pre-, present- and post-case study data from a three-year school-based mentoring program in Hong Kong, this paper examines how the effective delivery of the music curriculum in early childhood education can be enhanced by the implementation of mentoring in helping to ensure the long-term professional development of its participants. The findings indicate the inadequate amount of training and preparation for kindergarten teachers in Hong Kong to adequately deliver a multifaceted music curriculum, and the mentor could fulfill the role of a music specialist. As a reference source for those considering the implementation of similar programs within their kindergarten settings, the findings can have applications across different subject areas, providing a practical perspective on the implications for sustained delivery as it pertains to novice and veteran teachers alike. To this end, a number of considerations as they relate to the research objectives – along with practical recommendations for the various stakeholders involved within early childhood education – are also discussed.

Introduction

In Hong Kong, early childhood education is offered to young children aged three to six at either non-profit making or private kindergartens run by voluntary agencies and private enterprises respectively. It is only in the past decade that it has become officially recognized as the initial stage of formal education (Education Commission, 2000). Concerns for high quality early childhood education and the professional development of teachers have since gone hand in hand, with various policies aimed at upgrading the qualifications of kindergarten teachers being introduced (Audit Commission, 2000). However, continuing issues – most notably those of aspects of policy, continuing professional development needs, training, support and resources – have effectively acted as a barrier to consistent delivery, making such a report both necessary and timely. Within this context, the early childhood music curriculum and teachers' attitudes towards music teaching have been affected by the subsequent, "knock-on" effects. In light of the above, this paper describes a three-year school-based mentoring program and discusses how lessons learned from it can provide a basis for exploring ways that benefit both specialist and non-specialist music teachers.

Background

Many of the current quality issues concerning early childhood education date back to the 1970s when, due to an influx of refugees from Mainland China, there was a dramatic increase in kindergarten enrollment (13,000 in 1953 to 198,351 in 1979), together with heavy demand for preschool education and care (Rao & Koong, 2000). An inadequate supply of qualified teachers led to the Government of the Hong Kong Special Administrative Region (HKSAR) addressing the need to upgrade the training of existing kindergarten teachers in its *White Paper* on "Primary Education and Pre-primary Services" (Hong Kong Government, 1981), the first target – for 45% of present in-service kindergarten teachers to receive twelve weeks of basic early childhood education teacher training in order to become Qualified Assistant Kindergarten Teachers – being set in 1986. However, it was not until *The 1994 Policy Address* that the government's commitment to improving the quality of early childhood education was affirmed: in addition to an allocation of HK$163 million being set aside for the following four years to provide training to kindergarten teachers, the academic requirements were raised to two passes in the Hong Kong Certificate of Education Examination. Qualified teachers were duly reaffirmed as an essential factor in the delivery of a high-quality education in the *Education*

Commission Report No. 7 (Education Commission, 1997), along with the recommendation of the establishment of the Quality Education Fund. Among various other policies related to early childhood education, those detailed in the Education Commission's reform proposals of 2000 are regarded as being among the most critical. In focusing on the professional competence of educators, a series of initiatives – including the allocation of HK$51 million for kindergarten-based educational research by 2005, the publication of a new edition of the pre-primary curriculum guide, and a review on pre-primary education initiated in 2006, as well as the Pre-primary Education Voucher Scheme initiated in 2007 – reflected the government's commitment to enhancing the quality of early childhood education.

At the same time, the professional development of teachers has long been a major concern. In addition to focusing on improving the professional competence of kindergarten educators (including raising the minimum academic entry qualification for kindergarten teachers to five passes in the Hong Kong Certificate of Education Examination from the 2001/02 school year along with the ruling, since September 2003, that all such newly appointed teachers be required to possess a Qualified Kindergarten Teacher qualification or its equivalent), the Advisory Committee on Teacher Education and Qualifications recommended a generic Teacher Competencies Framework in 2003 in order to help individual teachers acquire both the knowledge and the competency to deal with every aspect of children's growth and development. While enhancement of the quality of early childhood education is still hindered in part due to the limited provision of professional training – in 2007-08, the number of intake places provided for kindergarten teacher education stood at 150 Qualified Kindergarten Teachers and 180 Certificate in Early Childhood Education holders in full-time pre-service mode and 245 Certificate in Early Childhood Education and 60 Bachelor of Education (Early Childhood Education) – there is at least an acknowledgement on the part of the government of the importance of a solid foundation in both early childhood education and continuing professional development for all early childhood education teachers.

Early childhood music education in Hong Kong

According to official statistics (Education Bureau, 2009b), there were 889 local kindergartens and 75 non-local kindergartens with a combined total of 137,630 students and 9,866 kindergarten teachers operating in Hong Kong for the school year 2008-09. Nevertheless, despite the fact that 96% of those teachers have received Qualified

Kindergarten Teacher training, there is a wide discrepancy in terms of curriculum, teacher qualifications and quality of education (Curriculum and Development Council (CDC), 2006).

Early childhood education music programs are often criticized by researchers as lacking direction and planning (Scott-Kassner, 1999), while research has shown that early childhood education teachers lack confidence as a result of an absence of both the musical knowledge and skills required (deVries, 2006; Scott-Kassner, 1999). Although part of the problem may be due to the traditional marginalization of music education within the Hong Kong education sector, the situation is no doubt exacerbated by the fact that the curriculum framework as set out in the "Arts" Learning Area of the *Guide to the Pre-primary Curriculum of Hong Kong* (CDC, 2006) is intended to serve as a guide only and not a statutory requirement, thereby resulting in varying quality in terms of the music instruction provided.

There is also the phenomenon gaining ground in Hong Kong of informal music learning taking place outside schools. Developed with the intention of developing children's musical potential, such music centers typically offer weekly classes for infants, toddlers and young children. However, the fact that without regulatory standards the quality of such informal provision is likewise likely to be variable makes the necessity of ensuring that teachers are able to provide children with developmentally appropriate musical experiences an even more pressing concern.

Whitebook (2003) has concluded that, with regard to the relationship between high level teaching qualifications and quality early childhood education, teacher education at the level of a four-year college degree is the best path towards achieving quality learning outcomes in such programs. Consequently, those kindergarten teachers who are at present only Qualified Assistant Kindergarten Teacher holders, have until the end of the 2011/12 school year to upgrade to the level of the Certificate in Early Childhood Education, while those who already hold the appropriate Qualified Kindergarten Teacher qualification are advised to enhance their professional growth in order to meet the curriculum goals of early childhood education " … to nurture children to attain all-round development … and to stimulate children's interest in learning" (CDC 2006, p. 18) through continuous study. Despite these advances, more still needs to be done if early childhood education is to be fully recognized as a fundamental sector of the Hong Kong educational system.

While the current approved certification courses are designed with diverse learning modes in mind (Education Bureau, 2009c), there still exists the need for graduates of both

the Qualified Kindergarten Teacher and Certificate in Early Childhood Education courses to benefit from more training in music knowledge and teaching skills. Most kindergarten teachers with limited musical backgrounds are currently expected to acquire the ability to design a music curriculum and carry out the requisite classroom music activities after having received only 20-25 hours' training on the Qualified Kindergarten Teacher course and after having undertaken a music module within the Certificate in Early Childhood Education program respectively (Chan & Leong, 2007). In addition, there exists a heated debate concerning the relative merits of "specialist" versus "non-specialist" music teachers (Music Council of Australia, 2005), with those in favor of specialist training (Heneghan, 2001; Seddon & Biasutti, 2008) arguing that non-specialists lack the confidence and teaching expertise to competently implement a comprehensive music curriculum. Whatever the respective merits, the reality is that young children's music education in Hong Kong is still mainly delivered by classroom teachers who find it difficult to prepare meaningful instruction (Nardo, Custodero, Persellin, & Fox, 2006).

The case for mentoring

Mentoring has been recognized as an effective form of job-embedded professional development whereby the skill development of mentees is enhanced by experienced practitioners in a personal way (Zepeda, 2009). It can also help mentees to hone their "soft skills" and emotional intelligence in addition to developing their teaching strategies through learning how to learn (Klasen & Clutterbuck, 2002).

Crucial to the whole process is the use of an in-depth developmental approach, the main benefit of which lies in its function of helping the mentee proceed from one stage to another without suffering from the loss of content frequently encountered in standard professional development courses (Wallace & Gravells, 2007). For teacher education, mentoring is recognized as an effective way to equip teachers with the necessary skills to effectively implement new teaching practices (Weaver, 2004) by providing ongoing on-site support with one-to-one guidance. As a result, mentoring has become particularly popular in early childhood education teacher training for helping unqualified early childhood education teachers develop their professional knowledge, skills and attitude (Onchwari & Keengwe, 2008).

Despite this, relatively little research has been carried out concerning mentoring in both teacher education, teacher professional development and kindergartens in Hong Kong (Yip, 2001). Following a successful mentorship scheme initiated by The Hong Kong

Institute of Education in 1998 aimed at training student teachers to become more competent within the classroom (the Institute Preschool Professional Interface), an extension was proposed to include fresh early childhood education graduates (Wong, 2000). It was the creation of this scheme that formed the foundation of the present research study.

Methodology

This study adopts a case study approach to investigate the outcomes of a three-year school-based mentoring program that constituted the professional development of eight early childhood education teachers in a selected Hong Kong kindergarten. Case studies are usually adopted "when 'how' or 'why' questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context" (Yin, 1994, p. 1).

Two research questions guided this case study:

1. What challenges do "non-specialist" early childhood education teachers face when teaching music?
2. What are the positive outcomes of the mentoring program in the professional development of early childhood education teachers?

Case study school and participants

An established, church-affiliated, non-profit making kindergarten in Hong Kong was selected as the case study school, where the researcher was recruited to work in the capacity of arts specialist ("music and art"; hereafter, music) and tasked with the additional responsibility of initiating a three-year school-based Arts Curriculum Development Plan accompanied by a staff mentoring program.

The primary participants (mentees) involved with the program between September 2003 and July 2006 were eight Key Stage 2 and Key Stage 3, full-time female non-music specialist teachers, all of whom were in possession of the Qualified Assistant Kindergarten Teacher qualification. Based on the starting date of the mentoring program, kindergarten teaching experience ranged from four to fifteen years, with none of the participants having received any formal or instrumental training prior to the commencement of the program.

Structure of the program

The structure of the program was as follows:

Year 1 – The researcher spent two and a half days at the kindergarten per week providing case study participants with models of music teaching (including setting the teaching and learning objectives, implementing the school-based music curriculum, leading the various listening, performing, moving and creating activities, using effective music teaching strategies, applying the music pedagogies into teaching practices and assessing children's musical outcomes).

Years 2 & 3 – The researcher spent three and a half days at the kindergarten per week to reinforce the training of participants' music teaching by using a collaborative model and offering further assistance in the areas outlined above.

Data collection

Qualitative and quantitative data were collected via a combination of two surveys (one pre- and the other post-case study), ongoing observations and a post-case study interview, and subsequently analyzed using content analysis and SPSS in order to identify the issues related to early childhood education music teaching and the effectiveness of school-based mentoring. In addition, documentation such as school development plans, archival records of teachers' professional development history, and artifacts such as project outlines were also assembled throughout the three school years.

The case study data were collected during the implementation of the program over the course of the three-year period; the longitudinal data collection was carried out in three phases spanning six years as described below:

Phase 1 (Pre-Case Study)

Pre-mentoring survey

This consisted of thirteen closed- and open-ended questions and was distributed to the eight case study participants by the researcher in person at the kindergarten. Versions were made available in both English and Chinese. The response rate was 100%. Data from the pre-mentoring survey were collected with the purpose of:

1. Identifying issues related to current early childhood education music instruction and the professional development needs of early childhood education teachers in Hong Kong.
2. Gaining an understanding of music activities within Hong Kong kindergartens.

Findings (Phase 1)

All case study participants considered music education to be important within the sphere of early childhood education, principally for its ability to:

- foster children's interest in music;
- foster children's development in all four objectives of the curriculum framework ("Physical Development", "Cognitive and Language Development", "Affective and Social Development", and "Aesthetic Development") and;
- integrate with other learning areas such as Art, Physical Education, Language, Mathematics, General Knowledge, and Biblical Knowledge.

About half the respondents thought that thematic learning was the most desirable music learning approach, designating the four key teacher roles within the process of children's music learning as instructor, curriculum implementer, learning partner and motivator. 'Lack of relevant music knowledge in teaching "Music Appreciation"' was given as the main obstacle (37.5%) in teaching music, with "A lack of innovative teaching", "A lack of music games for teaching music elements", and "Inadequate time for preparing teaching materials" each receiving 12.5%.

The conclusions drawn suggest that the participants required further training in music skills and pedagogies in order to allow them to meet their teaching needs and thus fulfill their roles as instructors, curriculum implementers, learning partners, motivators and supporters of the student-centered learning process.

Phase 2 (During the Case Study)

Information collected mainly from sustained classroom observations (carried out both as non-participant researcher and participant-as-researcher) of daily music teaching and learning was used for:

1. Examining the information collected in Phase 1.
2. Understanding the mentoring process.
3. Investigating the effectiveness of the mentoring approach in order to enhance music education in the kindergarten case study.

Findings (Phase 2)

(a) Non-participant researcher observations

The researcher as non-participant observer recorded teachers' classroom performance in a classroom observation checklist where participants' performance was rated on a three-level scale (Low, Medium, High) using twelve teaching criteria.

(b) Researcher-as-participant observations

Throughout the three school years, case study participants were given weekly researcher-as-participant observations with the formative purpose of facilitating professional growth and increasing music teaching effectiveness. All observed events and interactions in the classroom observations were detailed as "field notes" and then summarized in an annual report review of the arts curriculum at the end of each of the three school years. The findings demonstrated an increase in strength in both participants' music teaching (particularly their engagement) and their further music training, combined with students' happier participation in the music activities by the end of the program.

As with the non-participant researcher observation, each participant was rated on a three-level scale. There was a significant increase noted in music teaching performance following the implementation of one additional mentoring day per week in the second and third years of the program, as Table 1 shows:

Table 1. ***Individual Participant's Performance Level in Classroom Observations***

Case Participant	*Non-Participant Observation*	*Researcher-Participant Observations*		
	End of 1st Year	**1st Year Modeling as focus**	**2nd Year Mentoring as focus**	**3rd Year Mentoring as focus**
Kitty	L	L	M	M+
Peggy	L	L+	M+	M++
Alice	L+	M	M+	H
Sammi	L	L	M	M+
Kelly	L	L	L+	--
Yanly	L	L	L++	--
Elaine	L	--	--	L+
Wendy	L	--	--	--
Joyce	--	--	--	H

H: High Level *M: Medium Level* *L: Low Level*

Phase 3 (Post-Case Study)

Information collected from the post-mentoring interview was examined in order to:

1. Understand the experiences and challenges of individual mentees in the school-based mentoring program implemented in the kindergarten case study.
2. Determine the effectiveness of the mentoring approach to enhancing music education in the kindergarten case study.
3. Understand the existing provision of professional development for early childhood education teachers in Hong Kong.

Findings (Phase 3)

(a) Post-mentoring interview

The standardized, open-ended interview was conducted three years after the completion of the school-based mentoring program, in June and July 2009, with the intention of determining the sustained effectiveness of a mentoring approach to early childhood education music teaching. Two pilot interviews were undertaken prior to the formal interviews with two non-participants who were also kindergarten teachers. Lasting 20-30 minutes, the individual interviews with the seven case study participants enabled in-depth information to be collected about interviewees' past experiences as mentees of the

school-based mentoring program at the kindergarten, their desired music teacher training, and their recommendations for music mentors working with early childhood education teachers.

During the post-mentoring interview, Joyce (one of the mentees) made the case for music specialists to support regular kindergarten teachers by citing "their [teachers'] diverse music backgrounds", qualifying this by stating that, unless they were employed full-time – " … they could not provide teachers with relevant music teaching experience and continuous support."

Discussion

Key Issues

The key issues relating to mentoring and professional development in early childhood education were compiled into five themes ("Continuing Professional Development Needs", "Challenges and Teaching Strategies in Music Teaching", "Facilitation of School Development", "Teaching Confidence" and "Effectiveness and Outcomes of the Mentoring Experience") before subsequently being matched with the two research questions. Various aspects pertaining to issues and effectiveness were then compared across each of the research methods, as shown in Table 2:

Table 2. ***Comparison of Data Collected from Multiple Research Methods***

Issues \ *Research Method*	*Literature Review*	*Pre-mentoring Survey*	*Mentor's Observation*	*Post-mentoring Interview*
Policy				
A relatively low entry (academic & professional) requirement and limited provision of professional training	✓	–	–	–
A controversial Pre-primary Voucher Scheme (PEVS)	✓	–	–	–
Continuing PD Needs				
An unspecific and rather complicated Teacher Competence Framework (TCF) for identifying PD needs	✓	–	–	–
CPD needs to develop both musical and pedagogical knowledge & skills for supporting the daily music teaching of EC teachers	–	✓	✓	✓

Table 2 (continued)

Issues \ *Research Method*	*Literature Review*	*Pre-mentoring Survey*	*Mentor's Observation*	*Post-mentoring Interview*
Training & Pedagogy				
A lack of music learning background & instrumental training; and inadequate mastery of knowledge & skills (Musical & Pedagogical)	✓	–	✓	✓
A limited provision of music training & in-depth music pedagogies, and a lack of ongoing music training provided in the EC teacher education programs	✓	–	✓	✓
EC Music Curriculum				
A lack of diversity and learning progress in the music curriculum, an alignment between curriculum and learning objectives, as well as planned music lessons.	✓	–	✓	✓
Marginalization of music in school curriculum	✓	–	–	✓
Support & Resources				
An unequal allocation of Government expenditure on education	✓	–	–	–
A lack of continuous school support, including music teaching resources & training, time for preparing teaching materials, and clear administrative arrangement	–	✓	–	✓
Teachers' Attitudes towards Music Teaching				
The effectiveness of mentees' training, teaching, and students' music learning outcomes were positively affected by teachers' enthusiasm for music teaching	–	–	✓	✓
Effective Outcomes				
An effective music teaching which could arouse students' interest in music learning, nurture students' love of music, and ultimately children's music learning was enhanced.	–	–	✓	✓
Various positive changes were brought to mentees' daily music teaching practices, such as an enhanced confidence in music teaching	–	–	✓	✓
Teachers were able to adopt a student-centered approach and stress on nurturing children's development in imagination and creativity by means of integrated arts learning; while children are also able to engage in such activities and their ability of appreciation was fostered.	–	–	✓	✓

Overall, the findings highlight the importance of mentoring as a long-term process in enhancing non-specialist teachers' music teaching and, ultimately, children's music learning in the Hong Kong context. Job-embedded professional development training is also considered to be effective for enhancing early childhood education music teaching.

Theme 1: Continuing Professional Development Needs

Asked to share their thoughts on further music teacher training, the majority of the case study participants listed music knowledge and skills, music theory, and Orff pedagogy – as well as instrumental and vocal training – as the specific kinds of instruction they wished to receive.

In clarifying the position concerning the direction of early childhood education, the reform proposals put forward as part of the document published by the Education Commission (2000) reinforce an ongoing desire on the part of the government to ensure the need for high quality delivery. Moreover, in identifying such frontline education workers as the key players in implementing education reform, the proposals recognize the importance of targeting teachers' ongoing professional development. Two of the ways this has been visualized are firstly by the specific policy requirement – to be achieved initially through a number of one-year full-time pre-service early childhood education courses to provide 200 and 440 training places in the 2000/01 and 2001/02 school years respectively – that every kindergarten teacher should obtain the qualified kindergarten teacher qualifications by the 2003/04 school year and, secondly, that in order to enable qualified kindergarten teachers to further their studies, different early childhood teacher education providers offer Certificate in Education (Kindergarten) training places. While all this is undoubtedly to be welcomed, it is estimated that only about half of the kindergarten teachers had completed the Certificate in Early Childhood Education. A different situation concerns the Teacher Competencies Framework, developed by the Advisory Committee on Teacher Education and Qualifications (2003), perceived by many practitioners as being too generic to allow for the addressing of specific individual professional development competencies. This is especially true when viewed in the light of the numerous changes that (early childhood) education is continually undergoing via a variety of different factors. Further complicating the issue are the copious standards descriptions given within the same document, which not only have the potential to dissuade teachers (Maloney & Barblett, 2003), but also imply a set of competencies to be achieved as opposed to guideposts for encouraging personal growth and career development of all teachers (Day, 1999). Taking the wider and

longer-term view, it would be heartening to see a greater emphasis placed on the mentoring process as an approach that uniquely demonstrates – as the pages of this report are at pains to point out – the effectiveness of meeting the needs of both teachers and children.

Theme 2: Challenges and teaching strategies in music teaching

Responses from the case studies revealed that teachers had learned certain effective music teaching strategies from the school-based mentoring that could provide their children with more meaningful and interesting music education through project-based activities and thematic approaches to integrate the different learning contents. In this regard, Joyce's summary of the benefits of mentoring provides an accurate representation of all the participants' views:

> I have learned to set clear short-term and long-term teaching objectives … design a diverse and systematic curriculum … enhance children's music learning progressively by means of a three-year systematic and developmentally appropriate music learning scheduled progress, integrate the use of various contemporary music pedagogies, diverse teaching contents and resources … as well as enhancing teaching planning and practice accompanied by continuous review." [Joyce]

However, mentees still felt they lacked adequate resources and ongoing support from the school in order to implement them. Project-based activities and thematic approaches to integrating the different learning content areas were identified as the main strategies learned for providing children with more meaningful and interesting music education. The experience of the case study participants revealed that despite music training being identified as a key issue in Hong Kong early childhood education, within current teacher training programs at least this was inadequate in the areas of the music pedagogy component – hence the need for mentoring.

Theme 3: Facilitation of school development

Continuous school-based mentoring was felt by the participating teachers not only to have provided them with a richer set of resources, but also to have helped facilitate development within the school. Such development can and should, it was emphasized, extend to curriculum and learning objectives, diversity and learning progress within the present early childhood education music curriculum, as well as planned music lessons. One of the factors presently inhibiting this was the perceived marginalization of music, suggesting that apart from a statutory early childhood education curriculum that values equally each learning

area, adequate training for designing a quality music curriculum is an indispensable requirement.

Theme 4: Teaching confidence

The case study responses indicated that mentoring not only helped increase non-specialist teachers' confidence in music teaching by means of various strategies and support, but also enabled them to become aware of their own weaknesses in music teaching.

Despite the dramatic increase of funding for pre-primary education outlined earlier, early childhood education has received an allocation of just 13.0-14.6% of the total yearly expenditure (compared to 21.5-23.0% for Primary, 35.3-38.2% for Secondary, and 25.7-28.7% for Higher education) over the course of the past six years (Education Bureau, 2009a). Such limited funding within the early childhood education sector has consequently left many such instructors with, at best, discontinuous professional development training, resources and time for preparing music classes. In addition, an apparent lack of increase for training places within the intake provision for early childhood teacher education from the 2004/05 to 2007/08 school years has led to only 37.3% of kindergarten teachers becoming Certificate in Early Childhood Education holders (The Budget, 2009), thereby falling somewhat short of the 2008/09 revised estimate and 2009/10 estimate of 48.5% and 59.0% respectively.

Theme 5: Effectiveness and outcomes of the mentoring experience

Mentoring has been shown to be effective in enabling participants to gain the confidence and skills for their daily teaching by means of various strategies and support, thereby bringing about positive changes in their practices, arousing their students' interest, nurturing a love of the subject and ultimately enhancing their children's learning. Teacher enthusiasm is fundamental to effective communication and a pedagogical necessity widely recognized as a component of effective teaching quality which in turn is capable of making a great impact on various learning outcomes in all disciplines and at different grade levels from kindergarten to college (Tauber & Mester, 2007).

Within music education, teachers' enthusiasm for music teaching can positively affect the effectiveness of mentees' training and teaching as well as students' music learning outcomes. The case study participants' responses reinforced these findings, revealing a very positive reaction to the overall mentoring experience, especially in such areas as enriching music knowledge and music teaching experiences, as well as teaching

content, elements and resources. Here, the responses revealed that despite their limited backgrounds in music education, the mentoring had helped enhance the effectiveness of all participants by allowing them to learn and gain the confidence and skills necessary for their daily music teaching. Moreover, the benefits continued to be evident three years after completion of the program.

Conclusions

This longitudinal case study has identified important issues in five areas associated with the implementation of a school-based mentoring approach for enhancing early childhood education music instruction. In this way, the effectiveness of long-term professional development in enhancing both music teaching and learning has been more clearly determined.

Three main points have emerged from the study. The first is that mentoring and professional development are not unrelated concepts. In fact, mentoring can be considered a form of professional development, and the findings indicate that a school-based mentoring approach can be highly effective in enabling teachers to gain the necessary confidence and skills to equip them in their daily (music) teaching, despite perhaps having a limited background in a particular subject area. Additionally, such benefits can continue to be evident in the participants' (music) teaching practices within their respective kindergartens long after the completion of the mentoring program.

The second point is the acknowledgement that while the policies initiated via the Education Commission's reform proposals ten years ago *are* having an impact, with some notably positive effects being experienced by the practitioners of early childhood education, it is equally true to say that there is currently little real support for the mentoring process given at an official level. The findings from this research study – essentially those outlined above concerning the effectiveness of school-based mentoring in enabling teachers to gain the necessary confidence and skills for their daily music teaching needs, along with the evidence of residual benefits up to three years later – suggest that this is an area deserving considerably more consideration by policy makers. In so doing, there is also the potential for the tertiary sector, by working more closely with schools, to benefit through the creation of a stronger synergy between the two sectors.

The third is that there is clearly a niche for the role of the music specialist, ostensibly to support traditional kindergarten teachers' music teaching. As mentioned before, current graduates of both the Qualified Kindergarten Teacher and Certificate in

Early Childhood Education courses are required (despite frequently limited musical backgrounds) to be able to both design a music curriculum and carry out classroom music activities after having received 20-25 hours' training on the former or having undertaken a music module on the latter. Despite a desire expressed on the part of the participants, an estimate puts at less than 10% the number of kindergartens in Hong Kong that currently have a supporting music specialist.

To summarize, then, it is hoped that the findings of this study will prompt all those concerned with the promotion and delivery of early childhood education to value mentoring as a powerful motivational tool as part of a teacher's individual professional development. Viewed in this light, there is the very real opportunity for the findings presented here to be regarded as something of a "pilot case" for other subjects. While more research undoubtedly needs to be done, the five areas considered to be crucial for the successful implementation of mentoring to be undertaken, irrespective of the particular subject area, are: (1) to clarify the program goals and make them explicit to all participants; (2) to ensure ongoing school support and commitment; (3) to offer adequate opportunities and time for teacher reflection; (3) to encourage continual communication between mentor and mentees; and (4) to provide ongoing constructive feedback.

Done properly, mentoring clearly offers benefits not only to the mentees and their students, but also translates into a wealth of gained experience on the part of the mentor. All this can only serve to enhance and thus moving forward early childhood education (music) teaching and learning.

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ICT integration in primary school music education: Experience of pioneering countries and its implications for implementation in Hong Kong

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Abstract

There have been many claims about the benefits that the use of technology can bring to music learning. In fact, examples of successful applications and high levels of motivation associated with computer-based music learning reported in the literature have evidentially substantiated both the feasibility and adaptability of technology applications to music education. This paper describes the experience of Information and Computer Technology (ICT) integration in primary school music education in countries where both pioneering and relatively advanced developments have taken place. A comprehensive study of related literature and curriculum documents has been undertaken, aspects including major software programs development for music education and its pedagogical orientation, hardware configuration and classroom organization, applications of ICT in music teaching and learning, requirements for curriculum, hardware and software, and technology competency requirements and related professional development for music teachers are studied. Findings from the literature reviewed and documents analyzed reveal that ICT can best support constructivist approach to music learning, particularly activities of creative nature such as composing, improvising and creative music making; in addition, resource and related circumstantial factor as well as music teacher's readiness were found to be the most influential factors of successful ICT integration. Coupled with these findings, conclusion and implications for ICT integration in primary music curriculum in Hong Kong are then drawn and discussed.

Introduction

In Hong Kong, since the launching of the five-year strategic plan in IT education in 1998 to promote the use of IT for enhancing teaching and learning in school education, several related research studies had been done (for example, Cheung-Yung & Yip, 2004; Ho, 2004) regarding the implementation of ICT in school music education in Hong Kong. Nevertheless, issues associated with subject integration at the school level have not been fully scrutinized. Thus the main purpose of this paper is, through an extensive review and analysis of related literature and documents in other countries, to provide reference for ICT integration in primary school music teaching and learning in Hong Kong. In the subsequent sections, a study of ICT and music technology integration in music education in countries where both pioneering and relatively advanced developments have taken place (including the United States, the United Kingdom and Australia) will be undertaken, the state of integration in primary schools such as major software programs development for music education and its pedagogical orientation, hardware configuration and classroom organization, applications of ICT in music teaching and learning, requirements for curriculum, hardware and software, and technology competency requirements and related professional development for music teachers, will be discussed.

State of ICT Applications in Music Education

Since the emergence of the personal computer for instructional applications in school education from the late 1970s, music-oriented ICT applications have been employed in music education for more than two decades (Feldstein, 2001; Reninger, 2000; Webster, 2002). As reported in numerous books, journals, periodicals and the Internet websites, technology has been used in a wide variety of music classroom activities in the United States, the United Kingdom and Australia. These activities are *composition* (including arranging - for example, see Carr, 1997; Casey, 2005; Ellis, 1995; Folkestad, Lindstrom & Hargreaves, 1997; Forest,

1995; Reese, 1995, 2001; Roulston, 1995; Hickey, 1997; Langol, 1998; Pierce, 1998; Siegel 2004, *keyboard class* (for example, see Altiere, 1997; Bissell, 1998; Forest, 1995; Renfrow, 1995), *music theory* (including music reading and harmony - for example, see Bustard, 1997; Casey, 2005; Hrycay, 2002; Renfrow, 1995), *musicianship training* (including rhythm training and aural training - for example, see Casey, 2005; Renfrow, 1995), *music appreciation* (including listening and history - for example, see Armstrong, 2004; Haldey, 1996; Roulston, 1995), *accompaniment* (for choral and instrumental activities - for example, see Farnham, 2004; Kersten, 2004; Leong, 2004; Pierce, 1998; Woody & Fredrickson, 2000) etc. There are findings from many research studies that support the contention that ~~–~~music technology has now emerged as a fully-fledged teaching methodology along side … approaches such as Orff-Schulwerk, Kodály, Dalcroze and other established pedagogies" (Stevens, 1996, p. 185).

Software with pedagogical applications in music education

A review of music technology resource guides such as the *ATMI Technology Directory* (2004) published by the Association for Technology in Music Instruction (US) and the *Music IT Pack* (1997) published by the National Council for Educational Technology (UK) indicated that hundreds of software programs have been developed for music education. As a result of concurrent advancements in hardware, music software programs have evolved from several models ranging from the traditional drill-and-practice type instructional software (for teaching area such as music rudiments and aural skills and characterized by the behaviouristic model of programmed instruction in the late 1970's, e.g. *Practical Theory*—published by Alfred Publishing, *Practica Musica*—published by Ars Nova) to a wide variety of music software applications along the lines of constructivist knowledge building which have been produced in recent years (Reginger, 2000; Webster, 1998, 2002). The traditional drill-and-practice software continues to improve (in terms of audio and visual facilities) and

for the content to function as an effective instructional tool (e.g. *Adventures in Musicland*—published by Electronic Sourceware Systems). Meanwhile, music production software (for scoring, sequencing and digital audio processing, e.g. *Finale*—published by Coda Music), *Cakewalk*—published by Opcode), *Cool Edit*—published by Syntrillium Software Corporation) emerged to streamline the process of composing and music production (Reginger, 2000); music instruction software that was characterized by the constructivist models of learning emerged to provide computer-mediated contexts for students ~~to~~ construct their understanding of music [and musical knowledge] through their [experience] … expertly guided by teachers" (Webster, 2002, p. 43).

The theoretical and philosophical foundations of constructivism are based on principles of learning from theorists such as Dewey, Vygotsky, Piaget, Bruner and Gardner in the fields of education, educational philosophy and educational psychology. Constructivists perceive learning as the construction of knowledge through experience, and emphasize children's cognitive growth through ~~e~~xploration, unstructured learning, and problem solving" (Roblyer & Edwards, 2000, p. 62). Therefore, the constructivist approach to learning requires students ~~to~~ construct knowledge themselves rather than simply receiving it from knowledgeable teachers" (Roblyer & Edwards, 2000, p. 67). Characteristics of constructivist models of teaching and learning include the provision of ~~r~~esource rich environments", the organization of ~~p~~roblem-oriented activities", the employment of ~~v~~isual formats" as metaphor, the emphasis of ~~c~~ooperative/collaborative learning", and the encouragement of ~~l~~earning through exploration" (Roblyer & Edwards, 2000, p. 67-68).

Webster (2002) points out that technology has been used ~~in~~ a more constructionist context" (p. 43) in the last decade. According to Webster (1998, 2002), music software supporting the constructivist approach to learning covered categories such as flexible-practice,

guided instruction, games, exploratory, and creativity. In addition, on top of the software programs which engage students directly in learning, accompaniment software, music production software as well as Internet-based information and communication tools also playing a significant supporting role in music teaching and learning.

Hardware configuration and classroom organization

Reginger (2000) has proposed two categories that represent the typical configuration of school computer facilities for music teaching and learning that may be general and music-oriented. General computer laboratories usually contain:

- several computers of one platform (Macintosh or PC)
- CD-ROM and DVD-ROM players
- printer(s)
- headphones
- amplified speakers
- basic software (e.g. music software for drill and practice and for notation) (P. 27)

whereas a music-oriented computer workstation usually includes the following components:

- keyboard or synthesizer
- computer
- CD-ROM and DVD-ROM players
- headphones (or other amplification hardware)
- mixer
- audio control or routing system
- advanced software (e.g. software for sequencing, MIDI notation, and musical accompaniment) (p. 27)

With regard to the patterns of classroom organization, Reese (2001) points out that three types of technology settings can commonly be found in schools.

- One computer with the teacher leading whole-class activities
- One or more computer ―centers" at the back or side of the classroom
- Use of a general school computer lab or dedicated music lab with a whole class (p. 46)

When only a single computer workstation is available in classroom, a teacher can use this as a presentation tool—an ―electronic blackboard"—by demonstrating music software for

whole class teaching (see, for example, Kassner, 2000; Pierce, 1998; Siegel, 2004). Alternatively, the single computer workstation can be used in a ―learning centre approach" where the teacher sets the computer workstation as a learning centre, and students can work on some music software applications independently, in pairs or in small groups. Kassner (2000) points out that ―learning centre approach" is ideal for learning about topics such as ―timbre, form, harmony, melody, rhythm, notation, music history and style, keyboards, composition, and multicultural awareness" (p. 39). According to Reese (2001), the learning centre approach can be incorporated into class activities in two different ways. In the first approach, the student(s) is(are) taken away (on rotational basis) from normal class activities to work at the centre while the teacher works with the rest of the class (see, for example, Roulston, 1995). In another approach, a computer centre is set up concurrently with other non-computer-based learning centres for small group activities, and all students in a class are organized into small groups to work simultaneously at centres of different learning tasks (see, for example, Casey, 2005). For arrangements in a classroom setting with more than one music workstation being available, one workstation can be used for teacher's presentation while the rest can be set up as learning centres for different computer-based learning tasks. Nevertheless, in teaching practice, both approaches require the teacher to carefully plan the classroom environment, and to work out procedures, schedules and related learning materials.

Obviously, the most favourable setting would be a dedicated music laboratory equipped with hardware of the computer workstation configuration. In such a setting, a whole class of students can work simultaneously on a range of activities such as keyboard literacy, computer-aided instruction, scoring, sequencing, arranging, and multimedia CD-ROM applications, either individually or in pairs, depending on the quantity of computer workstations and the nature of activities (see, for example, Altiere, 1997; Carr, 1997; Forest, 1993, 1995). For the less well-equipped general computer laboratory setting in which MIDI

keyboards are not normally available, students can work in almost the same manner as in a dedicated music laboratory except for activities where keyboards are strictly required (Reninger, 2000).

Applications of ICT in music teaching and learning in primary schools

Early in this paper, examples of ICT applications for school music education at various levels of school education were cited. More specifically, there are quite a number of well-documented cases of technology being employed in music education at the primary level. In the United States, Forest (1993, 1995) reported that technology had been used in a wide variety of ways to teach music to children from pre-kindergarten to 5th grade. Early childhood music learning for pre-kindergarten through 2nd grade was largely supported by computer music games in *Adventures in Musicland* (published by Electronic Courseware Systems). Children explored fundamental music concepts and expanded their musical knowledge through experiencing music in a computer-mediated environment. From 1st grade to 3rd grade, learning of music fundamentals such as sight-singing, music reading skills, pitch identification, keyboard knowledge, ear training was supported by technology-based activities in *Piano Partners Music Learning System* (developed by Margaret Waldmann). In 4th grade, technology had been used to teach music appreciation and notation; from 5th grade, more creative experiences were provided to children with the addition of *Music Time* (published by Passport Design Systems) notation software, activities such as keyboard skills, arrangement of music, composition and ear training were arranged in a keyboard laboratory in conjunction with the *Piano Partners* software package. According to Forest‘s observations, technology encouraged active learning in music where students were engaged actively in computer-mediated music making and learning.

More importantly, technology can cater for different styles of learning and help students to discover and develop their creative musical talents. Carr (1997) reported that a keyboard laboratory (Korg keyboard lab system) had been used to teach general music to students of 3rd grade and above, and found that technology helped students to ~~"a~~udiate the music they compose" (p. 32). Altiere (1997) used the keyboard laboratory (Yamaha Music in Education system) to teach general music at elementary level, and found that technology helped to reinforce musical concepts. Her teaching was enhanced as technology was found to facilitate instantaneous hands-on experience as well as assessment tasks given to students. Bissell (1998) pointed out that technology integration in elementary music curriculum provides numerous creative opportunities. Through working with keyboard-based software programs such as *MiBAC Music Lessons* (published by MiBAC Music Software, Inc) and *Music Lab* (published by Musicware Inc), lower elementary students may explore basic elements of music such as pitch, tempo, volume, timbre, as well as experiencing improvisation with these music elements, and upper elementary students can explore the extended functions of the software such as the manipulation of a variety of sounds (timbres) and rhythmic styles. Bissell (1998) also pointed out that technology provides a motivating environment and powerful tools with which students may create, record, evaluate and edit their music; through experimentation in various music making activities such as improvising, performing, arranging, and composing, students' creative experiences may be enriched. Pierce (1998) reported that technology was used to create accompaniments for class choral activities and in students' compositional activities in her general music class in elementary school. *EZ Vision* (published by Opcode Systems Inc.) sequencing software was used for students' creative composition in a single computer workstation (with sound module and keyboard) situation. Students (grouped in pairs) worked in rotation following an activity guideline while the rest of the class was having the regular music lesson. Farnham (1998,

2004) used *Musicshop* (published by Opcode Systems Inc.) sequencing software to prepare accompaniments for rehearsals and performance, and observed that technology helped promote the efficiency of rehearsal as well as increasing the quality of performance in his music programme. Casey (2005) demonstrated from her own classroom experiences that ―integrating technology into the music curriculum entices students to actively engage in learning" (p. 53). Student-centred computer-based activities in a learning station approach were organized along with her weekly music lessons to reinforce the regular 5th grade curriculum. She used *Music Ace* (published by Harmonic Vision.) for students' practice in note identification, interval training, and pitch matching, and used *Finale Notepad* (published by Coda Music), *Master Trax Pro* (published by Passport Design), *Band-in-a-Box* (published by PG Music Inc.) and *Super Duper Music Looper* (published by Sony Media Software) for students' compositional activities.

In Australia, Roulston (1995) reported that music software applications had been used as part of music class activities. In each upper school (years 4 to 7) music lesson, two students were taken away (on a rotational basis) during their regular music class to engage in computer-based music activities. Students were introduced to notation skills through note-writing/composition activities with *Super Studio Session* (published by Bogas Productions). Students also used CD-ROM titles such as *Musical Instruments* (published by Microsoft Inc.) and *The Orchestra: The Instruments Revealed* (published by Warner New Media) to learn about Western musical instruments through guided activities with worksheets. She concluded that technology applications are ―effective means of promoting greater enthusiasm for music" (p. 29), while computer-based compositional activities can provide more capable students with challenging learning experience in music, whereas multi-media music applications might provide less highly motivated students with rewarding learning experiences.

Curriculum, Hardware and Software Requirements, and Implementation Planning Associated with ICT Integration

In 1999, the United States-based Music Educators National Conference (MENC) published *Opportunity-to-Learn Standards for Music Technology* which, as a teacher reference, addressed the implementation of technology in music teaching and learning. This publication outlined technology standards for the elementary school (Grades 1 to 6); the requirements for *Curriculum and Scheduling* are as follows:

1. Use of technology is a regular and integral part of instruction.
2. Teachers employ instructional strategies that appropriately utilize the unique capabilities of technology.
3. Learning experiences in the curriculum include the use of computer-assisted instruction, MIDI sequencing, music notation software, Internet music resources, and electronic musical instruments to help students acquire the knowledge and skills listed in the National Standards for Music Education.
4. Software and hardware selections are made based on the learning goals established for the students.
5. Music classes have the same degree of access to school technology resources, including technology labs, as other classes in the school.
6. Learning profiles (e.g., attendance records and progress reports) for individual students are maintained using databases and other record-keeping technologies.
7. Children with special needs have the same access to technology-based music instruction as other children in the school. Appropriate adaptive devices are available as needed. (Music Educators National Conference, 1999, p.3)

Concerning the provision of hardware, software, teaching materials and classroom space, the suggestions are as follows:

Equipment

Minimal:

1. Every music classroom should contain one multimedia-ready computer that is Internet capable and includes: audio in/out capability, General MIDI sound generation, powered speakers, CD- or DVD-ROM player, and a MIDI keyboard connected to the computer. When a teacher must move between classrooms and schools, a similarly equipped laptop computer is preferred for that teacher.

2. The school computer lab is equipped with dual headphones and MIDI keyboard controllers for use by the students.
3. Students have access to eight digital keyboards (possibly portable units) with standard-size, touch-responsive piano keys.
4. A large-screen video display for class presentation.

Desirable:

1. In addition to the minimal specifications, the classroom teaching station has two to three additional multimedia-ready computers with keyboard controllers (dual headphone capable). Alternatively, there is a digital keyboard lab or dedicated computer music lab with fifteen or more computers configured in a similar way to the workstations recommended in Number 1 above. All equipment includes powered speakers, a computer display projector, and large-capacity removable disk storage.
2. For instrumental instruction, alternative MIDI controllers, such as wind, guitar, string, and drum controllers, are available.
3. Music teachers have the same access to scanners, digital cameras, and other multimedia equipment as teachers in other disciplines.
4. A computer video projector to enhance class presentations in large classrooms.

Materials/Software

Minimal:

1. The software library contains at least six titles of instructional software that reinforces listening, analyzing, reading, and describing music. A plan to purchase three new titles each year is in place, and existing software is upgraded on a regular basis.
2. At least six titles of multimedia software that enables children to create, improvise, compose, and perform music are also available. A plan to purchase three new titles each year is in place, and existing software is upgraded on a regular basis.
3. There is Internet software for supervised access to Web resources.

Desirable:

1. Additional multimedia and software titles are available, and a plan to purchase six new titles in each category each year is in place.
2. The software library contains software for generating music arrangements and accompaniments and libraries of MIDI accompaniment files.
3. There is a basic sequencing/notation package, appropriate to the age level, for recording and printing music.
4. Students have access to basic digital audio editing software for capturing, modifying, and reproducing music.
5. Music teachers have the same access to graphic, multimedia, and Web authoring software as teachers in other disciplines.

Facilities

Minimal:

1. Suitable space is available in the dedicated music classroom for one computer with appropriate power and Internet connections.
2. Students have access to a school computer lab.

Desirable:

1. The school provides music classroom space with appropriate furniture, power, and Internet connections for multiple computer stations.

(Music Educators National Conference, 1999, pp. 3-4)

In the United Kingdom, similar recommendations were made in several different documents. References to curriculum content recommendations regarding the use of ICT in teaching and learning at the school level are set out in the *National Curriculum—Programme of Study for Music* (published in 2000). At Key Stage 1, although the mandated requirement for the use of ICT has not been specified in the National Curriculum for music, opportunities for using ICT within the programme are in fact suggested. At Key Stage 2, a mandated requirement is stipulated in the section concerning the *Breadth of Study*. At this stage, students‘ knowledge, skills and understanding should be taught through ―using ICT to capture, change and combine sounds”. More specifically, ―Pupils should be taught … how to prepare information for development using ICT, including selecting suitable sources, finding information, classifying it and checking it for accuracy” (National Curriculum Online, 2005).

Regarding the reference for the acquisition of facilities required for ICT integration in the music curriculum, the *Music IT Pack* (published by National Council for Educational Technology—NCET in 1997) and the document *Entitlement to ICT in primary music* (published by British Educational Communication Technology Agency—BECTA in 2003) provide detailed information about and requirements for purchasing the hardware and software for ICT-based teaching and learning. In the *Music IT Pack*, comprehensive guidance on choosing and using the right IT equipment for music classroom is provided. The configuration and specification of major hardware (including equipment for computing,

recording and electronic music) required for different teaching and learning settings are also illustrated, different types of programs (with typical product examples) compatible with teaching and learning are introduced, and finally the criteria for selecting software are suggested. According to the *Music IT Pack*, a typical computer system for general music education applications should basically include components such as:

- multimedia computer
- speakers
- headphones
- microphone
- printer
- modem
- soundcard
- CD-ROM drive (NCET, 1997b, p. 1)

Suggestions have also been made for the acquisition of additional or music-specific peripherals to cater for the needs of particular applications in teaching and learning such as Sequencing and Scoring. Teachers might, depending on the type of classroom activity to be organized and at their discretion, acquire equipment such as:

- MIDI interface and MIDI keyboard (for MIDI sequencing)
- MIDI interface, MIDI keyboard and MIDI sound module (for MIDI sequencing using an external sound source) (NCET, 1997b, p. 7)

In addition, a wide range of ICT applications useful in music education, including the following, are included and suggested in the document *Entitlement to ICT in primary music*.

- computer software and CD-ROMs
- electronic means of communication (e-mail and the Internet)
- equipment for making and replaying sound recordings (e.g. microphones, cassette/minidisc recorders)
- equipment that can alter sounds to give „special effects‘ (e.g. add echoes)
- electronic musical instruments (e.g. keyboards) that can produce a range of alternative timbres. (BECTA, 2003, p. 1)

In Australia, references to the utilization of ICT in music teaching and learning at the primary years are specified in the Arts curriculum documents of the individual states and territories which have been developed on the basis of the 1994 national curriculum document on the Arts—*The Arts - Curriculum Profile for Australian Schools* (published by Curriculum

Corporation in 1994). In some states and territories such as Queensland, New South Wales and the Northern Territory for example, only universal statements regarding the integration of ICT in the entire curriculum area of The Arts are made in the curriculum documents (Board of Studies - New South Wales, 2000; Northern Territory Government, 2002; State of Queensland, 2002). In other states and territories, statements associated with ICT integration are set out explicitly; for example, in Australian Capital Territory, the *Arts Curriculum Framework* provides references for using ICT in music teaching and learning. The section describing the scope of The Arts learning area indicates that ~~"~~electronic equipment (computers, synthesisers and other electronic devices) may be used for extended sound exploration, performance and composition" in music learning in the Upper Primary Years (Australian Capital Territory, 1994, p. 69). In Victoria, the *Curriculum and Standards Framework II* (Victorian Curriculum and Assessment Authority, 2001) outlines references for using ICT in teaching and learning in the primary years. In South Australia, according to the *R–10 Arts Teaching Resource*, no technology applications are specified below year 7 of schooling (State of South Australia, 2004). In Western Australia, references related to the employment of ICT in teaching and learning in the primary years of schooling can be found in the *Outcomes and Standards Framework—The Arts* (Department of Education and Training, Western Australia, 2005, p. 39,41).

Among the curriculum documents regarding ICT integration in music teaching and learning which are available for teacher reference in the countries reviewed, the MENC's *Opportunity-to-Learn Standards for Music Technology* provides the most comprehensive coverage of essential information (including technology standards, requirements for curriculum and scheduling, and sugguestions for the provision of hardware, software, teaching materials and classroom space) with which teachers need to be acquainted. Despite a few explicit indications of ICT applications in teaching and learning being given in some

curriculum documents (for example, in the UK and in some states and territories in Australia), relevant statements in other curriculum documents are merely universal directives or suggested potential opportunities. These can be acted on by teachers at their discretion, taking into consideration the circumstances at the school level such as curriculum aims, class scheduling, resources and other logistic arrangements, in the actual implementation. In curriculum documents where ICT requirements are explicitly stated, it is worth noting that the proposed stages for integration are inclined towards the middle and upper years of primary education (Australian Capital Territory, 1994; National Curriculullm Online, 2005; Victorian Curriculum and Assessment Authority, 2001; Department of Education and Training, Western Australia, 2005). In addition, technology is expected to assume diversified roles such being employed as a musical instrument (e.g. a MIDI keyboard controller attached to a computer to become a digital keyboard instrument), a source of learning experience and a production tool in music teaching and learning.

Technology Competences and Professional Development for Teachers in the Applications of ICT in Music Education

As already discussed, much research has been undertaken regarding ICT applications in music teaching and learning. However comparatively fewer researchers have investigated the issue of professional development for music teachers to enable ICT integration.

In a survey of music teachers in Western Australia, Leong (1995) reported that only 11% of primary teachers indicated that their pre-service teacher education had adequately prepared them to use technology with confidence and competence. About 78% of primary teachers agreed that a compulsory unit on the applications of technology in the classroom should be included in music teacher preparation programme, and ~~–~~80% of music teachers were interested in attending workshops on the educational applications of music technology" (p. 22). The survey also identified that, although the strength of opinion had not been

specified, one of the reasons for music teachers not using technology in their teaching was due to ―lack of expertise, confidence" (p. 24). Leong (1995) concluded that technology must be accommodated in teacher preparation programmes, and that music teachers' needs for acquiring continuing education in technology must be addressed.

Merrick (1995), in a survey of music teachers in the New South Wales in Australia, reported that less than half (46%) of teachers surveyed were using music technology in class and that 75% of teachers indicated their overall computer knowledge and understanding was within the range from ―satisfactory" to ―very limited". Among the teachers surveyed, only 34% of teachers had received training in music technology in their pre-service teacher education programmes, and 61.5% of teachers had received some form of music technology training through in-service programmes. Teachers who had attended in-service music technology training programmes commented that these programmes ―failed to provide adequate detail to change the teachers' operation within the classroom situation" and had not given ―adequate time [for teachers] to master the skills and knowledge obtained" (p. 193). They further suggested that these training programmes should demonstrate ―how to use the equipment educationally rather than just … the technical operation" (p. 193). In response to these observations, Merrick (1995) proposed that in-service programme of music technology ―needs to be graded … not congested with information, … well structured, relevant to classroom needs and non-threatening in nature" (p. 196). In addition, Merrick (1995) suggested that ―the study of music technology, both at technical and educational level, needs to become a mandatory part of all pre-service music education courses" (p. 195), and that courses needed ―to offer core and elective coverage … [with] focus on particular area of music technology" (p. 195) and develop an understanding of technology-based teaching and learning.

Reese and Rimington (2000), in their study of music technology in Illinois public schools (K-12) in the US, found that, despite a large majority (83%) of music teachers participating in the study who ~~h~~had some kind of computer training" (p. 31), about 60% of teachers rated their expertise in music technology as ~~a~~average" or ~~b~~elow average". This might be the reason why the low percentages of teachers using computers during class time were observed and a large number of teachers (94%) indicated their desire for further training. Regarding access to music technology training, survey results revealed that ~~4~~5% of teachers [were] participating in self-guided learning and 34% [of teachers were] learning from colleagues or friends" (p. 29). Universities and School Districts had provided training to only 25% and 13% of teachers respectively. In addition, major obstacles for music teachers participating in computer training and reported in the survey included ~~l~~ack of time (67%), lack of school funding (57%), lack of personal funding (46%), and lack of access to training (44%)" (p. 29). Other obstacles included ~~l~~ack of relevant topics (26%) and poor quality of training (6%)" (p. 29). Obviously, the informal training undertaken by a considerable number of teachers was ineffective and unsuitable. However, Reese and Rimington (2000) concluded that ~~u~~ntil structured, organized training becomes generally available, strategies should support teachers in the pursuit of self-guided learning" (p. 31). Given the circumstances reported in the study, the self-guided learning model of professional development might be the most practical and immediate solution to the problems identified.

In a survey regarding the content of pre-service undergraduate elementary music methods courses taught at nine major Midwestern universities in the US, Abril and Frego (2003) discovered that despite the fact that ~~t~~echnology has been in public and higher education for over twenty years, … technology receives the lowest rating as an instructed content area" and has not been incorporated as a substantial portion in these courses. The possible reasons they suggest for this phenomenon might be due to ~~a~~ pre-existing

technology course, the availability of equipment, [and] the time allowed in the syllabus to include technology" (p. 19).

With regard to the knowledge and skills music teachers required for using music technology in classroom, the Technology Institute for Music Educators (TIME) in the United States published the *Technology Strategies for Music Education* as a guide and reference to national standards for in-service training in music technology. Seven major areas of competency in music technology directly applicable to music instruction were outlined.

1. Electronic musical instruments
2. Midi sequencing
3. Music Notation software
4. Computer-assisted instruction
5. Multimedia and digitized media
6. Internet and telecommunications
7. Information processing, computer systems, and lab management (Rudolph et al, 1997, p. 37)

In addition, the MENC Task Force on Music Technology recommended that technology training for music teachers in elementary school (grades 1 to 6) should include:

Minimal:

1. A planned program of ongoing staff development to provide teachers with training in applying technology in the curriculum is in place. Training is available on a variety of levels to match the varying backgrounds and proficiencies of teachers.
2. To remain up-to-date in the field, all music educators receive at least one staff development day per year for technology training. Training is conducted by those with an awareness of the needs of music educators.
3. Teachers have easy access to email and web services for professional and curriculum development, research, and other communication needs.
4. Teachers are provided with ample time to consult with other colleagues about the use of technology.
5. Technical support and mentoring by those who are knowledgeable about the hardware and software used by music educators is available to music teachers.
6. Teachers are provided with the necessary development time for creating new curriculum materials that make effective use of music technology.

Desirable:

1. A well-planned, long-term program of professional staff-development support is available to all music teachers.

2. Music teachers have ready access to Internet-based professional development opportunities.
3. In lab settings, an appropriate student/teacher ratio is maintained through the use of teacher assistants or aides.

(Music Educators National Conference, 1999, p. 3)

In Australia, Merrick (1998) suggested that the following content areas should be included as part of the Music Technology National Standards for music teachers.

Music Technology

- general knowledge of computers, synthesisers, sound modules, sound cards, and their configuration;
- a knowledge of the different types of instruction that can be employed with computers, i.e. Computer Assisted Instruction, Computer Based Learning, Creativity;
- an awareness of MIDI and its operation;
- an awareness of hard drive recording systems;
- satisfactory knowledge and skills developed through ‗hands on' experience with a set of established sequencing, editing, auto-accompaniment and aural software;
- an awareness of Internet access and CD-Roms for resource development and classroom application;
- an awareness of keyboard laboratories and consoles

Classroom Practice

- an awareness of new approaches to classroom practice with technology focus including new learning structures for the teacher and students to use, i.e. cooperative learning, problem solving, facilitating independent learning;
- an awareness of the influence of technology on cognitive and metacognitive processing of learners;
- an awareness of the different structures and settings to use so as to attain educational outcomes of a satisfactory level. (pp. 41-42)

Research findings reported in this section revealed that there had been a widely-held view that music technology should be incorporated as core content in pre-service music teacher preparation programmes. However, despite the fact that music technology had been included in pre-service teacher preparation programmes for some years, music teachers with sufficient confidence in using technology in class teaching were still the minority (Leong, 1995; Merrick, 1998; Reese & Rimington, 2000). In particular, the percentage of technology-competent primary music teachers was even lower (Leong, 1995), and this was suggested as being due to ―a perceived incompatibility of technology with elementary general music" (Abril & Frego, 2003, p. 19). These observations reflect the situation that music

technology training currently offered in the pre-service teacher education programme is failing to meet music teacher needs in the classroom; therefore, revision and restructuring of technology training are necessary to ensure music teachers are able to develop sufficiently confidence for fully utilizing technology in classroom settings.

Another important research finding is the demand for in-service training for teachers. Despite many music technology training opportunities for serving teachers being provided, there was still a big demand for in-service training (Leong, 1995; Merrick, 1998; Reese & Rimington, 2000). This phenomenon might be partly due to the evolving technologies—music teachers need to continuously update their knowledge and skills related to music technology. Other possible reasons might be connected with the inadequate training received and the inaccessibility of technology training opportunities. Other major issues identified relating to the provision of in-service training that need to be addressed include the course content (particularly the orientation of training) and the means of provision (mode of delivery). Regarding the content of technology training, Merrick (1998) suggested that technology training for music teachers should, in addition to the training for technical and practical proficiency, also develop an understanding of technology integration in teaching and learning. As for the mode of delivery of in-service technology training for music teachers, training can be in wide variety of formats ranging from self-instruction to formal courses of higher learning including peer instruction, distance learning, training provided by music technology vendors, summer courses and postgraduate courses (Reninger, 2000). The provision of in-service training should be based on both the training resources available to music teachers and the preferred training style of music teachers.

Discussion

Although some music teachers might still consider technology as gimmickry, it has in fact provided music teachers with new approaches to teaching music, and a host of technological alternatives are available to broaden curriculum activities and enrich the musical experience of students. As alluded to previously, from the perspective of classroom music teaching and learning, a number of classroom teaching practices can be facilitated and enhanced by the integration of technology, and the most effective of all applications appears to be creative activities. Technology represents a new approach to creativity in music for children, with the computer-mediated platform making possible certain creative experiences that are less likely to be provided in traditional approaches. For instance, evaluations of students‘ performance as cited in the application examples reported that composing or arranging activities with sequencing or similar software not only facilitated the execution of activities, but also provided a more authentic experience that resembles that of a real composer or arranger (Webster, 1998, 2002). The capacity of these software programs to allow users to record, edit and print music is in itself a significant motivating factor in creativity. In fact, the actuality that students are able to assume the role of professional practitioner—i.e. composer/arranger—is in fact giving them learning experiences that are both unique and authentic.

Technology can also effectively support the teaching and learning of music reading, listening, rhythm and aural training through the employment of general musicianship software. Furthermore, technology applications directly involved with teaching and learning, production tools (such applications as sequencing, scoring, digital audio processing, and accompaniment), a wealth of music CD-ROMs, web browsing and communication tools are playing a prominent supporting role in classroom music. With the help of these technology tools, music lessons can be more adequately prepared and presented. For example, MIDI-

assisted accompaniment applications can enrich choral activities and facilitate other class activities that require accompaniment.

Despite the indisputable impact of ICT in music education, it is worth noting that not a single advocator of technology in the literature has asserted that technology-based methods will replace traditional pedagogies, but rather that they have the potential to enrich existing pedagogies. For example, Altiere (1997) indicated that, while using technology to enhance her teaching, such aspects as recorder playing, Orff instrumental performance, and singing were still to be taught in class. Reninger (2000) points out that ―technology will be there to assist students and teachers, but the most essential component of the music classroom of the future will be, as it has always been, the music teacher who guides students in their journey to understand music" (p. 31). From this perspective, music classrooms will probably not change greatly as singing and music making with class instruments will still be the main focus. However technology used to support these classroom activities will be modernized drastically and speedily, just like the replacement of the phonograph player by digital audio players (such as compact-disc player, Mini-disc player and MP3 player), or the replacement of VCR by the DVD video recorder. Technological innovation is part of an on-going renewal of pedagogies and music technology may be viewed as simply one of the latest classroom tools to optimize teaching and learning.

Conclusion and Implications for integration in Hong Kong

As cited in the literature related to the application of ICT in music education, many teachers have already incorporated technology into music teaching and learning with considerable success. Through a range of music software programs, ICT can support a wide variety of music activities in the primary music classroom and broaden the extent of students' learning experiences. More importantly, ICT integration extends the limits of conventional

delivery systems and activates changes in pedagogical approaches in music teaching and learning from being teacher-centred to more student-centred. Music software programs have evolved to better support the constructivist approach to music learning by providing students with a technology-mediated environment in which students can acquire their knowledge and understanding through unique and more authentic musical experiences. In particular, activities of a creative nature such as composing, improvising and creative music making, and other individualized activities can be usefully employed.

The audit of music curricular documents of the selected countries revealed that technology has become an essential and indispensable element in the music curriculum and is expected to assume multiple roles in teaching and learning. However, even though the requirements for ICT integration are mandated in the curricula, the implementation at school level is, to a large extent, dependent upon the resources available (including human resources), the physical teaching environment and the related logistic support. In fact, models of integration at the class level identified in the literature are basically resource-oriented, and the main determinant of the integration model included multiple factors such as hardware, software, classroom space and class scheduling. In addition, experience and exemplary cases from the selected countries illustrated that the scope of ICT integration is directly connected with the resources and other circumstantial factors.

In Hong Kong, accompanying the implementation of the region-wide IT in education policy, a comprehensive review of the primary music curriculum was carried out, and a new *Music Curriculum Guide* was published in 2003 and implemented from 2006 respectively. In this latest *Music Curriculum Guide*, IT elements have been incorporated, and explicit requirements for using IT in teaching and students‘ learning were specified. Information provided included proposals for IT-based activities, particulars of hardware and other related

resources, and instructional arrangements for typical teaching situations in primary schools. When compared with the technology standards and related curriculum requirements recommended for primary schools in countries which are relatively advanced in educational development such as the US and UK, recommendations made by the Education Bureau of Hong Kong (EDB) regarding primary school‘s acquisition of IT equipment and music program‘s entitlement to access-shared IT facilities for music teaching and learning are practically comparable at least to the minimum standards recommended in countries mentioned above.

Nevertheless, despite the fact that the resource and curriculum requirements were clearly specified, the implementation of curriculum contents of the new music curriculum are not mandatory but merely suggestions, primary schools in Hong Kong have been given high flexibility to allocate resource according to their genuine needs in relation to school-based curriculum development. In consequence, if music coordinators have little or no inclination to integrate ICT into their music programs to any great extent, most schools will at best adhere to the recommendations to allocate the minimal ICT and related resource for music teaching (Lee, 2006 & 2008).

Given resources and the related circumstantial factors have profound influence on ICT integration in teaching and learning, these two issues must be duly attended to and addressed by the school management of individual schools when realizing ICT integration. Besides, while allowing autonomy to schools in the curriculum implementation, the EDB might still need to consider issuing some mandatory administrative directives to assure appropriate and reasonable resources allocation and logistic arrangements so that ICT integration in music teaching and learning at the school level can actually be substantiated.

Furthermore, on the one hand, the realisation of ICT integration in music teaching and learning is fundamentally dependent on the resources and other circumstantial factors. On the other hand, music teachers' IT competency is equally important. As reported in the literature, lack of expertise and confidence was identified as one of the main reasons for music teachers not using ICT in teaching. In addition, the course content and the format of in-service and pre-service technology training that music teachers had attended were unable to address the actual needs of considerable number of teachers and to provide them with sufficient confidence in using technology in their teaching. These observations suggested that whether music teachers will employ ICT in their teaching or not is dependent largely on their technology competency which is directly connected with training. Given the significance of the teacher's role in ICT integration, issues related to music teachers' technology competence and the professional development for music teachers has emerged as another important factor linked with the successful ICT integration in music education.

In Hong Kong, from a pragmatic perspective, the provision of IT training for music teachers by the EDB as a whole was practically adequate in terms of quantity and content (Lee, 2006 & 2010). Nevertheless, it is still the responsibility of the EDB to maintain a continuous provision of sufficient amount of both level- and content-appropriate training places for music teachers to ensure that frontline practitioners are adequately equipped with the most up-to-date knowledge and skills required for ICT integration.

About the Author

Dr. Barry Kwok-yeung Lee, is currently Senior Teaching Fellow in the Department of Early Childhood Education at the Hong Kong Institute of Education. Dr. Lee earned his PhD in ICT in Music Education from Deakin University, an MA(Mus) from Hong Kong Baptist University, an MEd from Chinese University of Hong Kong, a BPhil(Ed) from University of Birmingham, and a PGCert(Computing) from City University of Hong Kong. His main research areas include ICT/music technology in music education; music education for young children; and technology education in early childhood education.

Dr. Lee has been enthusiastic in the development of school band music education in the past

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