CITY UNIVERSITY OF HONG KONG

An Exploration of the Effectiveness of Drawings in Recognizing Chinese Characters for Primary One and Two With and Without Dyslexia

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by

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In Hong Kong, there is still lack of an effective strategy for less- skilled elementary pupils (especially in primary one and two) and Cantonese-speaking dyslexics in learning to recognize Chinese characters. In this study, a learning approach was designed to explore the effectiveness of learning Chinese characters from drawing between pre-post tests. The exploration of the effectiveness of children's drawing in learning knowledge of the components of semantic-phonetic characters and recognition of the Chinese characters is conducted. Dyslexic participants and elementary pupils without dyslexia are studied. The results between pre-test and post-test help reveal that both elementary and dyslexic pupils can recognize more characters accurately after learning semantic-phonetic characters through drawing. With this new learning approach, children are allowed to understand the structure of semantic-phonetic characters, and to recognize characters without copying, indicating that drawing is effective, especially in enhancing pupils' memories and understanding of semantic phonetic characters. Even more, a simplified screening method used in this study is suggested in identifying Cantonese-speaking children who may at risk in dyslexia in Hong Kong.

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Chapter 1. Introduction

This study aims to explore a possible approach of drawing for elementary pupils with and without learning disability to learn Chinese characters. The major theme is to use drawing as a new learning approach to enhance children's memory in understanding various structures and meanings of Chinese characters. In Chapter 1, researchers try to discover children's understanding of their pictures, as well as the relationship between drawings and memories. In Chapter 2, Chinese characters' features, patterns of learning Chinese written characters in Hong Kong primary schools are considered. Chapter 3 deals with the situations and needs of dyslexic children in Hong Kong.

1.1 Children's Drawings

1.1.1   Why do children draw?

Children draw a lot of pictures spontaneously. It is universally believed that children always feel delighted when they are drawing. Children can express their feelings or wishes by drawing. If viewers show enjoyment in children's drawings, they are very delighted. It is common that children use their drawings to represent their experiences, interests, or things they have known in their living. Based on the developmental approach, Piaget and Inheder (1969) believed drawing is a reflection of how children understand the real world. The views of the world in children's drawing

are different according to their different stages of development. Piaget and Inheder (1969) pointed out that unrealistic production of children's drawings is because of their immature mental development in viewing the world. This implies that children's drawing is regarded as an instructive activity for children to develop representations of the world. When children begin to draw, they are trying to show what they have understood in their world. Therefore, drawing becomes an important way for children to further realize their lives.

1.1.2   Children's understanding of their pictures

Children understand their pictures as graphic representative objects. Franklin (1973) summarized the findings in the study of Smith that a child sees his/her drawings as representations although there is little intention of the child's representation in the process of drawing. It shows that there are certain correspondences between patterns and known objects in children's drawings. Children's drawing reflects the translation of knowledge and perceptual experience of real objects into forms and marks on the paper. Therefore, the assumption of children's understanding their picture is that children understand what they are going to draw is the pictorial representation of objects they have known.

According to Winner (1988), children's understanding of the graphic representation includes four components. The first two components are the

characteristics of pictures and the represented objects. Children can recognize the

similarities and differences between a picture and its representations. The third

component is the reality of a picture as both a flat object and a representation of the

three-dimensional world. The fourth component is the fact that pictures are made with

intentions and are to be interpreted. The above components confirm that children can

recognize the correspondence between the object and their drawings. Furthermore,

although there are different views on the children's intention in the process of drawing,

both Franklin (1973) and Winner (1988) also supported that children understand what

the picture, as their own production, represents for. In this study, the point of how

children understand their pictures was concerned because children were asked to

translate some objects in the graphic representations in their drawings. Their drawings

were regarded as symbolic representations used to examine their ability to recognize

and understand the meanings of Chinese characters.

1.1.3   The development of young children's drawings

         The development of children's drawings changes over time according to their

age. Lucquet's theory of intellectual and visual realism cited by Willats (1977) is the

well known theory of the changes in children's drawing. According to Willats (1977),

young children draw what they know, which is indicated as the idea of intellectual

realism; while older children draw what they see, which is referred to visual realism. In

fact, it is not difficult to recognize the intellectual realism in young children's drawings. From the researcher's observation in young children's drawings, for example, young children usually draw a house with a roof although they rarely see this kind of house in Hong Kong. Another intellectual realism is the "X-ray" drawing. From Freeman's views on x-ray pictures (1980), the subject which child draws is not visible in the real world. For example, a baby may be shown in the mother's womb. This shows young children draw what they know instead of what they see. Therefore, young children know the items in their drawings and this is consistent to the idea that young children understand their pictures which represent the objects they know.

Moreover, other theorists also supported that there are some changes of children's drawing development around the age of entering primary schools. According to Lowenfeld and Brittain (1975), children around seven to nine years old arrive the schematic stage. The schema represents the child's knowledge of objects in the world. In views of Lowenfeld (1975), the items in the children's drawings are all in spatial relationships in schematic age. Shapes and objects are more easily definable than those at the age before entering schematic stage. There are also some changes in drawing development in two stages within pre-operational and concrete operational stage based on Piaget's children cognitive development theory (1969), the features that preschools likely to use symbols in their drawings to represent their world in the pre-operational

stage. As children enter operational stage, they draw something which starts to fit into a

logical system.   Operational thinking allows children to combine, separate, order, and

transform objects and actions.   Such operations are considered concrete because they

think whether the object or event is present or not.

Children entering primary schools when they are generally in the later stage

of pre-operational can be sure to represent objects from symbols. In this study, pupils

from primary 1 and 2 were asked to draw pictures to represent the definite radicals of

Chinese characters. Drawing for representation in this study can cater to the

development of elementary pupils' drawing and can help children re-construct the

correspondence between object presentation and their drawing.

1.1.4   Children's memory in children's drawings

Children can enhance their memory through their deeper level of

processing. According to Craik and Lockhart (1972), individuals' recall is described as a

function of the depth of mental processing. Craik and Lockhart (1972) propose that

memory is just a product of the depth of processing of information. The depth of

processing is referred to how deep individuals understand the information from the

objects which is meaningful rather than surface information. The level of processing is

viewed as range from shallow to deep. There is a positive relationship between memory

and levels of perceptual processing (Craik and Lockhart, 1972). Therefore, this theory

implies that memory of individuals who have deeper processing from the semantic information of stimuli may keep longer and stronger than that of individuals who process the stimuli in shallow level such as on physical characteristic. Based on the theory of Craik and Lockhart (1972), the idea of individuals' recalling is that memory is as a result of the level of processing information. Therefore, children can improve their memory capacity through deeper processing on the object which involves a meaningful analysis.

Besides the meaningful analysis of that object, processing the object with self experience can also enhance individuals' memory. In case of drawing, this activity is a kind of self-experience. Findings in Gross and Hayne (1999) show that young children can recognize and describe their drawings after delays as long as several months or even a year. It indicates that children's drawing can enhance their memory and can recall the things after a long while. According to the findings in the study by Butler and colleagues (1995), it is easier for children to recall the event which happened over a span with drawing. In that study, participants in drawing groups reported more information of the event compared with participants without drawing did. It is believed that drawing related to a person's experience will have deeper processing level of the event and help to elaborate semantic information of the event. The capacity of memory may be greater if individual processes information which relates to own self

semantically and therefore drawing as the activity of self experience can facilitate children's memory.

The main theme of this study is to test the effectiveness of drawing in enhancing children's memory to recognize Chinese characters. According to the theory of level of processing (1972), children may obtain greater recall capacity for understanding and memorizing characters if they process the structure and meaning of those characters through drawing. Children may go further process by elaborating the meaning of Chinese characters through drawing. For example, after a semantic radical of a Chinese character is taught, it may trigger children's thinking of the meaning of characters, images on the basis of their past experience with the meaning of the radical under the process of drawing. Children may draw something represents an object. Therefore, it is better to recall the information because this deeper semantic processing from drawing will encode the meaning of a character and leads to better recall with similar meaning of that character. To summarize, deep processing from semantic analysis of information integrated with self experience may lead to better understanding and memory of the information. Thus, learning through drawing is suggested in this study.

1.1.5   Applications of children's drawing

Children's drawing is always used as a tool of reflecting children's

expressions in developmental and therapeutic assessments. In clinical settings,

children's pictures can be used for assessing children's personality, intellectual

development, emotion and communication pattern (Wilson and Wilson, 1977; Koppitz,

1968; Anastasi, 1976). In addition, children may draw to express their feelings.

According to Malchiodit and colleague (2001), drawing can facilitate children to talk

what they have witnessed or experienced in traumatic events, especially in children who

lack communication skills. In that study, children may also feel more comfortable to

talk about what has been happening in the traumatic event by drawing.

However, drawing is rarely used for educational setting except the Art lesson.

As above mentioned studies (Butler and colleague, 1995; Gross and Hayne, 1999), we

understand that children's drawing may enhance children's memory capacity and

facilitate them to talk more than what they have experienced. In this study, the

researcher would like to explore the effectiveness of children's drawing in recognizing

Chinese characters. This research promotes the learning of the structure and meaning of

Chinese characters of primary pupils through drawing. Key to the children's drawing is

the focus on the meaning of semantic radicals and enhancing their memory to process

the structure and meaning of characters. Particularly important in this study is the

combination of drawing and language learning that requires pupils understanding of

how to learn Chinese characters with the knowledge of structure of characters needed to

recognize the characters.

1.2 Learning Chinese characters

1.2.1   Learning Chinese language of Cantonese-speaking pupils in Hong Kong

Children in Hong Kong learn Chinese starting from kindergarten normally,

around the age of three. Before children enter primary school, they begin to learn single

characters, compound words and learn simple sentences. In Primary school, Children

start to learn more Chinese characters than before. Children in Hong Kong are required

to recognize around 960 Chinese characters within primary 1 and 2 (Education Bureau

香港教育局, 1995). The traditional approach for pupils' learning Chinese characters is

copying characters from textbooks after teachers' instruction. However, it may be

exhausting and boring for less-skilled elementary pupils and children with specific

learning disabilities to learn and understand the excessive amounts of Chinese

characters by just copying them. This study is going to explore a possible approach for

pupils to learn Chinese characters according to their interests and needs. In this study,

the researcher hopes to use drawing as the new learning approach to enhance children's

memory to understand the meaning and structure of Chinese characters.

1.2.2   The language development of elementary school pupils

Language has been regarded as symbolization of the expression of human. Language enables people to express and communicate with each others based on the forms of reading, writing and speaking. Although children's understanding of language is correlated with their age, the explanations of language acquisition are still argued between language is inherency and learning.

Some theorists seem to suggest that children inherit some specific language learning capacity. According to Yang (2006), children are born with an innate propensity for language acquisition which allow children to quickly figure out what is and isn't possible in the grammar of their native language. The language being a fundamental part of the human inheritance and the trait makes humans human, and its acquisition as a natural part of maturation.

However, the psychological tendencies bring children to learn language in a social environment. In the psychological aspect, the language development of children is related to their cognitive development because learning language can probably develop their ability in organizing and adapting to their living (Ginsburg and Opper 1969). Piaget's theory of children's cognitive development proposes some ideas for us to understand the language development of elementary school pupils. According to Piaget (1972), the period before entering primary school is a crucial stage for children's

learning language. From the views of Piaget (1972), the language development of children in this period which is generally referred to the preoperational stage occurs very quickly, but he also emphasizes that children's abilities of expressing themselves are limited during this period. According to Piaget (1972), children can acquire language gradually through interaction with people and the environment.

According to Piaget (1972), children in the preoperational stage learn to use symbols or simple concepts to express their thinking. Preschoolers prepare the ability of learning how to interact with other using their speaking language and words. As a result, children at the age around seven or eight who are entering the primary education can able to perform themselves through speaking or using simple symbols.

In the latter period of this stage, they tend to enter operational stage and are more able to express language verbally and start to monitor their writing skills (Piaget, 1972). In the beginning of this stage, children especially develop the ability of organization that they can sort objects based on their characteristics. They may even develop the ability to name and identify sets of objects according to meaning, graphic or other characteristics for information processing. These imply that typical children in primary 1 and 2 are able to use symbolic representation and start to organize new information in its type and characteristic.

In this study, the researcher would like to teach pupils language according to their developmental stage and their needs. In the application of this study, children learn some Chinese characters by using symbolic representation and learn to sort out components of characters. The following paragraphs are going to explain more details in Chinese characters.

1.2.3   Chinese language and the most frequent use of Chinese characters

When children learn to read Chinese, they must first learn Chinese characters. To support Cantonese speaking children for learning their mother tongue- Chinese, we should understand more about Chinese language. Chinese characters as Chinese written language are non-alphabetic language and each character represents meanings and a pronunciation with one syllable.

There are about 5000 Chinese characters used commonly in modern society (Ann, 1986; Suen, 1986). According to Ann (1986), there are 3500 characters often used in Hong Kong. Chinese characters are divided into six categories (cited in Xu Shen, Shuowen Jiezi 說文解字 by 左民安 2005) which included pictographs(e.g. 日 the sun、月 the moon), ideophonetics (e.g. 江 a river 、河 a river), associative compounds (e.g. 武 military 、信 a letter or believe), Ideographs (e.g. 上 up、 刃 a blade), phonetic loans (e.g. 老 old、考 take an exam) and synonyms (長 grow、 令 an order). Among these types of characters, about 95% of the characters are ideophonetic compounds in modern society (Cheng, 1987). This category represents the most

dominated group of characters in modern Chinese. Therefore, the importance of learning ideophonetic characters is the greatest for people learning Chinese.

In addition, there are different structural arrangements of characters mainly included independent (e.g. 目 eye、水 water、己 self), left and right structured (e.g. 付 pay 、塊 piece), top and bottom structured (e.g. 喜 happy、寺 temple), the three-component structured (e.g. 儲 save、雙 pair、樹 tree), closed or semi-closed structured (e.g. 國 country 、回 go back、風 wind) (Guo.B, 1995). For learning Chinese characters, the structures of Chinese characters which are frequently used are also concerned. Besides Chinese characters with independent structures such are used commonly, left-right structured Chinese characters are also used frequently which are over 60% of all Chinese characters (Gao and Kao, 2000). As a result, the type of left-right structured Chinese characters is also essential for people to learn Chinese.

In this study, ideophonetics and left-right structured characters are chosen for teaching pupils because the types and structures of those characters are most commonly used. It is appropriate for pupils from primary 1 and 2 to learn Chinese characters started from the elementary level. Therefore, the structure and meaning of ideophonetics would be focused in this study.

1.2.4.   The orthography of ideophonetics

The kind of ideophonetic Chinese characters also called semantic-phonetic compounds, is typically left-right structured. The orthography of each semantic-phonetic compounds contains both meaning and pronunciation information.

In general, an ideophonetic compound is consisted of two parts which are

semantic component (SC) and phonetic component (PC). A semantic component refers

to the semantic category of the character whereas a phonetic component gives an

indication to the pronunciation of that character. To understand semantic-phonetic

compounds in details, several examples are illustrated as follows. 河(river) and 湖(lake)

are typical examples of semantic-phonetic compounds of Chinese character. The SC in

河(river) is 氵, the 'water' category while its PC is 可(can) /Ho4/. Similarly, the

characters 坷 /Ho2/ and 柯 /Ho1/ have same PC '可'.

In case of semantic-phonetic compounds, the SC is usually refers to a

radical which is a semantic category. A radical (R) is the semantic root of a character

used for classifying related meanings of character and it is common to use a radical to

find a character in dictionaries. Thus, each Chinese character has its radical and Chinese

characters have been categorized in Chinese dictionaries by 216 semantic radicals (商務

新詞典, 1996). Another function of R is also a semantic component of characters which

has related meaning of ideophonetics. Among semantic- phonetic compounds, the

relationship between semantic component and meaning is strong. Therefore, the

semantic components can be used as clues for child to learn the meanings of

ideophonetics .The knowledge of the conceptual structure of ideophonetics and

orthographic analysis on Chinese characters among pupils would be investigated in the

study.

1.2.5.   Children's analysis of phonetic and semantic components of characters

As mentioned above, the semantic component (SC) of ideophonetics is related to the semantic category and meaning of characters whereas the phonetic component (PC) is related to phonetic information of that character. Some scholars propose that the functions of both SC and PC do not help children learn Chinese. According to DeFrancis (1984), it is difficult for students to learn characters from their semantic components because the semantic category of Chinese characters is unsystematic. There are 213 radicals of semantic categories varied from very simple to very complicated such as a simple R (人 person) and a complicated R (龜 tortoise). Moreover, DeFrancis (1984) also points out the pronunciation of some phonetic components may have a wide range difference from the tone or whole sound of original characters (e.g. different pronunciation from /盼 /Paan3/ and 分/ Fan1/ (PC). It seems that it is not suitable for children to learn the relationship of the meaning and sound components of Chinese characters because it will impose weighty load of learning various patterns of Chinese characters on children's memory.

However, findings in the study (Ho, Wong & Chan, 1997) disagree with the view of ineffectiveness of learning meaning and sound components for learning Chinese characters. In that study, it indicates that the reading skills of children who are even first graders can be improved because they understand phonological information of the

phonetic component and semantic information of the radical.   In addition, according to

the findings (Ho, Wong & Chan, 1997), helping students learn the way to differentiate

the phonetic and semantic components of ideophonetics and make correspondence of

the sound and meaning of that characters will definitely enhance children's memory

capacity for learning new characters.

Therefore, knowledge of the structure of ideophonetics can help children

understand new characters. Ho's study confirmed that semantic components are useful

in understanding the correlating semantic information of a character while phonetic

components can enhance children's ability to learn pronunciation of ideophonetics.

Correct identification of the semantic component in ideophonetics will also help to

decide the remaining phonetic component. In this study, the orthographic knowledge of

the phonetic and semantic information of Chinese character was examined in focus. To

improve the students' ability of recognizing the character, the phonetic and semantic

components and similar knowledge, was taught in this study to examine whether it can

help students read and understand the further meaning of characters.

1.2.6   The graphic-semantic relationship in Chinese Characters

Modern Chinese characters have been evolved from Oracle bone script

which was the oldest Chinese written characters (Keightley, 1996). This kind of writing

was made of pictographs and symbols primarily. This implies that there is a definite

relationship between pictures and the development of Chinese characters.

Since then, the Chinese characters are often universally regarded as

pictographics and it has been supposed that each Chinese character is a symbol or

graphical depiction of an object or an idea. Although Chinese characters are not only

learned as pictographic because it makes up only 5% of modern Chinese characters (漢

字的結構, 左民安), the majority of Chinese characters (about 95 percent of the

characters) is constructed originally from simple pictographs (DeFrancis, 1984).

Chinese language is a graphic writing system that uses graphic symbols to represent

mainly units of meaning or morphemes (Hoosain, 1991). Those simple pictographs and

symbols (e.g. 日 the sun, 月 the moon, 木 the wood) derived from pictures that they

have been standardized to make them easier to write. (DeFrancis, 1984). Therefore,

those simple pictographs are graphical representations of the meaning of things.

As above mentioned, modern Chinese characters are still derived from

hundreds simple pictographs that are related to the meaning of characters. Similarly, the

semantic components are also related to the meaning of characters. In general, those

pictographs from characters are the semantic components of that character. For instance,

the SC and pictograph of 時(time) is 日(the sun), the SC and pictograph of 村 (village)

is 木 (the wood). There is correspondence between graphic information and semantic information of semantic-phonetic characters (Wang, 1973).

According to Peng and Zhang (1984), graphic, phonological, and semantic information of Chinese characters is essential for people to recognize. From the findings of their study (Peng and Zhang, 1984), graphic information of Chinese characters is the most efficient indicator for both young child and the adult identifying characters. In addition, the research of Chen, Yung, and Ng (1988) show that graphic and semantic informations of character are the indication for Chinese to identify characters rapidly. They also support that there is a closer relationship between graphic and semantic informations of character. According to Wang & Guthrie's studies (2000), the graphic information is more likely used by less-skilled readers during character recognition. It is concluded that the graphic and semantic informations in Chinese character are important indicators in understanding Chinese characters especially for young children who are less-skilled.

Thus, in order to teach junior pupils to learn Chinese, educators and parents must make full use of the graphic and semantic cues of characters for children to understand the meaning of Chinese characters. Moreover, it is believed that pictures can be used as a representation of graphic and semantic informations of characters. Therefore, the effectiveness of children's drawing of the graphic and semantic

informations of characters in learning semantic-phonetic compound is explored in this study.

1.3   Pupils with Dyslexia

1.3.1   The definition of dyslexia

Besides primary pupils, dyslexic children were also examined in this study. In order to understand more about learning disability, topic on dyslexia and situation in Hong Kong is illustrated as follows:

Many children around the world are affected by dyslexia. The International Dyslexia Association of the United States (2005) estimates about 8 percent to 15 percent of students suffering from this learning disability. According to International Dyslexia Association of the United States (2005), dyslexia is defined that individual suffers a learning disability especially in language impairments. The characteristic of difficulties manifestly includes in the aspects of single word recognition, reading, spelling and written language. Besides those language impairments, it is also agreed that dyslexia includes poor personal organizational skills, development coordination disorder as well as visual spatial disorder.

Learning disability is not related to low intelligence, inadequate reading instruction, emotional factors, and lack of educational opportunity (Critchley & Critchley, 1978; Thomson, 1990). However, some western scholars think that dyslexia

is mainly related to an insufficient phonological awareness in English speaking children (Brady, 1986; Snowling, 1987). According to Snowling (1987), based on phonological awareness hypothesis, the difficulties in learning alphabetic language among English-speaking dyslexics is due to their lacks of learning the correspondence between letters and constituent sounds of speech. It reveals that reading and spelling an alphabetic language are required during the course of learning. However, the definition and causes of Dyslexia in Chinese-speaking children who learn a non-alphabetic language- Chinese, were seldom studied by western researchers.

1.3.2   Dyslexia in Hong Kong

There has been growing awareness of dyslexia in Hong Kong in recent years, but there is still no local definition of such specific learning disability. According to Educational Department in Hong Kong (2000), dyslexia in Hong Kong is referred to one of learning specific disabilities that individuals have difficulty in reading and writing. More details in the definition of students with dyslexia are posted as follows:

"These students have a weak working memory and slow speed of processing. They may deficits in their phonological and or visual-perceptual skills. They may switch off easily and have difficulties with sequencing, orientation and organization. Their difficulty has a neurological basis, and is independent of any sensory deficits, emotional and behavioral difficulties, or lack of learning experience." (Educational Department in

Hong Kong, 2000)

The above clearly describes that the definition of dyslexia in Hong Kong is not definite and sufficient. The other learning specific disabilities such as disability in oral language, disability in mathematics and non-verbal learning disabilities may also have some of the above characteristics. In addition, the causes of children with dyslexia in Hong Kong are also less definitive. However, some findings reveal recently that dyslexia affects some structural parts of children's brains depending on the language they read during nurture. (Wai et al, 2008). The result indicates that the causes of dyslexia may relate to neurobiological cause and there is difference of the causes of dyslexia between Cantonese-speaking and English-speaking children.

1.3.3   The number of dyslexic children in Hong Kong

Moreover, the number of children with dyslexia in Hong Kong is not distinct. Findings in the study of Ho, Chan, Tsang, and Lee (2000) suggest that there is 10% prevalent rate of Hong Kong students fall within criteria for dyslexia based on the results of the Hong Kong Test for Specific Learning Difficulties. A document by Legislative Council Committee on Education (立法會教育事務委員, 2005) showed that the number of cases known to the Department of Health (DH) and the Education and Manpower Bureau (EMB) was approximately 2000 and 4000 respectively up to 2004. These 6000 cases indicated 0.74% prevalent rate of the 811800 primary and

secondary school students in Hong Kong. The great discrepancy in the two reports of

the number of identification of dyslexic students in Hong Kong shows the case of

suspected dyslexics may be underestimated.

1.3.4   Lacks of systematic identification for Dyslexic children in Hong Kong

To help Chinese dyslexic children develop their full potential, we should

help them overcome their learning difficulties. However, before we provide the

remedial help for them, the more urgent step for helping them is to identify possible

cases of dyslexia in Hong Kong as soon as possible.

In fact, there are no systematic measures to identify students at risk with

dyslexia in Hong Kong. Although developmental screening is provided for children

aged 5 years old or below at the Family Health Service (FHS) of DH (Committee on

promoting holistic development of preschool children, 2005) there is no follow up for

these children who are at risk in dyslexia after entering into primary schools. Even

though, the Hong Kong Specific Learning Difficulties Behavior Checklist for primary

one school pupils was made available to schools to assist teachers in identifying

students suspected of having specific learning disabilities since 2000 (立法會教育事務

委員, 2005), pupils in primary one have been checked until the end of the first semester

around December and January and the result of identifying any learning problems and

additional educational needs have been given out at the end of primary one generally.

After the assessment of school, students suspected with learning problems and

suspected dyslexia may be referred to professionals from DH and EMB for further

diagnosis.

This would imply that to identify children with dyslexia in Hong Kong, it

takes at least one year and extends to primary one for identification. Since then, such

time-consuming identification may miss the golden period for children's learning with

additional supports if they can be diagnosed earlier. In this study, we are aware of the

early identification of children with dyslexia and the simplified checklist will be

suggested in identifying children suspected of dyslexia at the initial stage. We hope

Chinese children with dyslexia can receive appropriate intervention at an early stage.

1.3.5   The language and drawing development of dyslexic children

Sometimes, it is difficult for parents notice whether their child has the

characteristics of learning difficulties at an early stage because the range of language

development can vary from child to child. According to the views of Lai (黎程正

嘉,1996), it is obvious that there are delays in language and motor development of

dyslexic children compared to the children without dyslexia. She points out that, many

dyslexic children have early signs of their disorders at the pre-school stage. Their signs

of learning difficulties include early oral language impairment or difficulties in reading,

writing, co-ordination as well as concentration of learning simple patterns of sequential

activity. These difficulties probably arise from their imbalance or late developmental stage comparing to the development stage of other children with similar age.

As the above mentioned dyslexics have difficulties in learning language, they have trouble translating thought and what they have learnt into language and difficulties in connecting different information of the language. It is supported by Vail (1990), people with dyslexia struggle in the two-dimensional world includes reading, writing, spelling and mathematics. On the other hand, she indicates that dyslexics are much better in thinking three-dimension. Dyslexics are straight forward and highly creative and it is easier for them to think in pictures. It is easier for them to work out the problems by means of a three-dimensional way. This advocates that people with dyslexia may think easier through pictures. Bell (1991) suggested that the use of visualizing included picture imagery and word imagery to promote and enhance dyslexic's ability of reading and comprehension. This would also imply that pictures and drawing can be useful for dyslexic children's learning.

1.3.6   Dyslexic children's common errors in recognition of Chinese character

Reading Chinese is different from reading English because Chinese is not an alphabetic language. Learning Chinese focuses on the correspondence between visual patterns and meanings. Besides learning the characters' graphic pattern and pronunciation, children must learn the meaning of characters for reading as well.

According to Li and colleague (2005), the findings showed that Chinese dyslexics are weak in the graphic analysis of characters. As mentioned above, the relationship between graphic and semantic informations of character is strong. This would imply that reading difficulty in Chinese dyslexics is not only related to the poor correspondence between the structure and pronunciation of characters, but also related to a poor connection between the graphic and meaning of characters.

Because of difficulty in learning the correspondences between sound information and structure and meaning, Chinese dyslexic children might tend to confuse the characters with similar structures, sounds or meanings. They are not aware of recognizing orthography of characters (Cheung, 1999). According to Cheung (1999), dyslexic children had poor skills in determining the phonetic and semantic informations of ideophonetics. It is common in dyslexics may reverse the order of the structure of the character especially when the form of character looks similar to that of the others (e.g, "伯" instead of "柏"). Dyslexic children have more word-related errors (e.g. 歌 as 唱, since 唱歌 'sing' is a 2-syllable word) and fewer phonetic–related errors (e.g. 名 read as 明) than pupils without dyslexia. Semantic-related errors (e.g. 說 read as 話) are also commonly found in dyslexic children but not in normal ones (Ho & Ma, 1998). These kinds of reading error patterns of dyslexic children were studied here to see if the new learning approach can help them to eliminate their errors in reading.

1.3.7   Lacks of systematic support for Dyslexic children in Hong Kong

Although dyslexia is a lifelong condition for which there is no cure,

appropriate intervention can help dyslexic children overcome their difficulties in

learning language. In order to support dyslexics learning Chinese character, it is still far

behind in Hong Kong when compare to other developed countries. Up till now, only the

enthusiastic organizations such as the Hong Kong Association for Specific Learning

Disabilities and the Pathways Foundation Limited develop the academic and knowledge

to help the children and their family members concerned. However, the government

lacks to provide effective and universal support for dyslexics in Hong Kong, especially

the appropriate support for Cantonese- speaking dyslexic children for learning their

mother tongue- Chinese in their schools.

In this study, the researcher really wants to explore a possible learning

approach for dyslexic pupils so that they can remember the orthography of

semantic-phonetic compounds of Chinese characters and recall and recognize the

meaning of them as accurate as possible.

1.4   Aims of This Study

For improving pupils' ability to recognize Chinese characters, the

experiment was aimed to examine the drawing that can become the learning strategy for

those children with and without dyslexia processing and recognizing the orthography of

Chinese characters.

This study aims at improving the ability of children's learning Chinese characters from their elementary level. It is better for dyslexic pupils and elementary pupils without dyslexia (especially primary 1 and 2) to process and recall a series of left-right structured and phonetic-semantics compounds which are used commonly in the primary level. This study is characterized by drawing different radicals of six characters (with different semantic radicals, but same phonetic components).

The study is intended to concentrate on structural features, semantic information, and pronunciation of Chinese characters. Learning starts with the pupils' recognition of the meaning of radicals and usage of radicals. Then, a series of characters with different semantic radicals, but same phonetic components (抄、沙、吵、炒、妙、秒) were taught in its orthography and semantic information to the pupils. To make full use of the cues of semantic and phonetic components of characters, the pupils were asked to draw a picture to represent the semantic radical of each character and were taught the phonetic components explicitly respectively (the knowledge of the orthography of characters). The characteristics of these six characters (抄、沙、吵、炒、妙、秒) are described in this study:

1.) Traditional Chinese characters

The traditional and standardized written Chinese characters system used in Hong

Kong.

2.) Left –right structured

This category represents the largest group of characters in modern Chinese

(Gao and Kao, 2000)

3.) Semantic-phonetic compounds

This category represents the largest group of characters in modern Chinese

(Gao and Kao, 2000)

4.) Different semantic radicals

5.) Same phonetic components

6.) Less than 10 strokes in each character

Learning from simple characters first among elementary pupils

7.) Commonly used in primary school

All characters are categorized as the Chinese Characters recommended for the

subject of Chinese characters in the primary schools (Poon and Kong, 2003)

8.) Similar study level of elementary school pupils

The structures, meanings and pronunciations of those target characters were

described in Table 1 (see below) according to the study of the Chinese Characters

recommended for the subject of Chinese characters in the primary schools (Poon and

Kong, 2003),.

Table1 - *The Characters Used in This Study*

	Meanings	Radical/ Semantic components	Phonetic component	Pronounciaiton	Number of stroke	Study level
抄	Copy 謄寫、抄寫	手（扌）	少 /siu2/	Tsaau1	7	Primary 1
沙	Sand 細小的石粒	水（氵）	少 /siu2/	Saai1	7	Primary 2
吵	Quarrel 爭吵、吵鬧	口	少 /siu2/	Tsaau2	7	Primary 2
炒	Fried 烹調方法之一，把食物放在鍋裡加熱並隨時翻攪。	火	少 /siu2/	Tsaau2	8	Primary 2
妙	Wonderful 美、好	女	少 /siu2/	Miu6	7	Primary 2
秒	Second 計算單位，六十秒為一分鐘。	禾	少 /siu2/	Miu5	9	Primary 3

The research questions for the present study were formulated in order to explore the effectiveness of drawing in recognizing Chinese characters for pupils in primary 1 and 2 with and without dyslexia in Hong Kong.

For the application of drawings in learning,

I.   To investigate the effectiveness of drawing which help pupils learn and recognize the structure and meaning of Chinese character

For understanding the pupils' learning Chinese characters in Hong Kong,

II.   To examine pupils' knowledge of the structure of semantic-phonetic compounds

III.   To examine pupils' understanding of the meaning and usage of semantic components of Chinese character

For the needs of dyslexic students in Hong Kong,

IV.   To investigate a new possible learning approach for recognizing Chinese characters among dyslexic pupils in Hong Kong

V.   To explore the simplified method of identifying pupils at risk or with dyslexia in Hong Kong as early as possible

Chapter 2. Methods

2.1   Participants

The study was conducted from four classes of two primary schools

volunteered to join upon the invitation. 66 children were tested and half of them

participated in the experimental group of this study randomly. All of them were studying

in primary 1 or 2 (6-7 years of age). All children were Cantonese-speaking Hong Kong

Chinese. All of participants successfully finished pre-post test from January to April in

2008. Even more, 5 confirmed dyslexic children who are the age of 6-7 (in primary 1 or

2) were also participated in this study and all dyslexic participants finished the whole

study individually. All participants agreed to take part in this study and a consent letter

from their parents was included as well. The characteristics of the participants were

summarized in Table 2.

Table 2 - *Number of Participants in Different Part of Study*

	Boys	Dyslexic boys	Girls	Dyslexic girls	Total
	(n)	(n)	(n)	(n)	(n)
Test of overall level of Chinese language knowledge	27	3	39	2	71
Pre-test	27	3	39	2	71
Post-test	27	3	39	2	71

2.2   Procedure

2.2.1   The Chinese language knowledge test (TCLK)

Before the experiment, all participants of four classes were asked to do the test of overall level of Chinese language knowledge (TCLK) individually by the researcher. 6 major questions in TCLK were set to test children's Chinese language knowledge including aspects of reading, pronunciation and writing. The questions are focused on testing children's understanding of using of semantic radicals, ability of writing the compound words, understanding the meanings of Chinese characters and ability of pronunciation. The results of this test are for analyzing the level of Chinese language knowledge among participants. Moreover, TCLK was explored the effectiveness of identifying children suspected learning difficulty in Chinese language, which is the main feature of dyslexia.

2.2.2   Pre-test

69 children were allocated into experimental groups and control groups randomly and finished the pre-test in groups. The participants in experimental group were required to learn characters with drawing whereas participants in control group learn the same characters without drawing. All dyslexic participants were assigned into experimental group for exploring whether the drawing in their learning is effective or not. In the pre-test, there were two parts. Participants answered each part in a sheet of

question paper consecutively. It took about 10 minutes in total.

The first part tested participants' understanding of the meanings of radicals (R) of Chinese characters (e.g. 扌- 手, 氵- 水). Participants were asked to finish two things:

1.) match the meaning of R within choices provided

   e.g. Match 扌 to the meaning of 手 (hand)

2.) re-write R, semantic component (SC) and phonetic component (PC) from a single Chinese character

   e.g. Please write the R (氵), SC (氵), PC (皮) of 波 (wave)

To test the usage of SC, participants were required to complete the second part of pre-test which included:

1.) choose the suitable SC into given characters which its SC is omitted from different semantic radicals of Chinese characters

   e.g. Please circle a semantic component to fill in the blank

   美＿少　(Wonderful)　　　　　　1.)扌　2.)禾　3.)女

2.) choose the suitable characters in the sentences provided from choice

   e.g.　小鳥唱出美＿＿的歌聲。

   (A bird sings in wonderful voice)

2.2.3   The teaching part

71 children were taught six Chinese characters depending on their groups

respectively. Those six Chinese characters (抄、秒、妙、沙、炒、吵) are also left-right

structured which have different SR (usually at the left side of characters)and same PR

(usually at the right side of character). Among our target characters, SR are 扌、禾、女、

水、火、口 while PR is 少. The structures, meanings and pronunciations of those target

characters were described in Table 1.1 (see above) according to a study of the Chinese

characters recommended for the subject of Chinese characters in the primary schools

(Poon and Kong, 2003),.

During the teaching part, the researcher explained the structure and the

meaning of each target characters with some sentences for participants in experimental

group (drawing group) to learn those Chinese characters. For example, the following

example of instruction was given to participants by the researcher, ' 抄 means to copy

from original message. This character is consisted of SC (扌) and PC (少). SC (扌), the

semantic component of this character represents the meaning of hand and therefore it is

closely related to the meaning of 抄 because we should use our hand for copying

something. In addition, when we find the semantic component of the character, the

remaining component (少) would become the PC of this character.' The examples of

compound words (抄寫、照抄) and the sentence which was 'We should not copy other's

homework.' (我們不應抄寫功課。) were shown and explained to participants.

After the researcher finished the above explanation of each character, children in drawing group were asked to draw a picture to represent the SC of that Chinese character on the left side of a sheet of paper (about 210mmX 149mm). On the right side of that paper, there was a printed PC(少). After all participants finished their drawing, they were explained the structure and meaning of that character again and were asked to re-write it in the blank area of the right side on the same paper. Participants were taught those target characters by drawing one by one.

The teaching process in other group (control group) was similar to the experimental one. The different thing was that the part of drawing was omitted as well. The participants were also offered the sheets of paper which are the same as the ones in drawing group. Similarly, there was a printed PR(少)on the right side of that paper. However, in this time, participants were asked to write target SC (扌、禾、 女、口、火、氵)on the right size of that paper and to write target character once in the blank area of that paper one by one. The time for whole teaching part in each group was about 30 minutes.

2.2.4   Post – test

The post-test contained 4 parts and it was after the teaching part. In the first two parts, all participants were asked to finish the test in a group which was similar to

pre-test, but the questions were re-assigned randomly. Both parts of answers should be

finished in two sheets of question paper .

The first part tested participants' understanding of the meanings of SR.

Participants were asked to finish two things in a group within about 10 minutes:

1.) match the meaning of R within choices provided

e.g. Match 扌 to the meaning of 手 (hand)

2.) re-write R, semantic component (SC) and phonetic component (PC) from a

single Chinese character

e.g. Please write the R (氵), SC (氵), PC (皮) of 波 (wave)

To test the use of SR after learning, participants were required to complete the

second part of pre-test which included:

3.) choose the suitable SC into given characters which its SC is omitted from

different semantic radicals of Chinese characters

e.g. Please circle a semantic component to fill in the blank

美__少 (Wonderful)   1.)扌   2.)禾   3.)女

4.) choose the suitable characters in the sentences provided from choice

e.g. 小鳥唱出美＿＿＿的歌聲。

(A bird sings in wonderful voice)

In the third part of post-test, all participants were asked to dictate six

characters which researcher had taught them in the teaching part such as copy (抄寫), a

second (一秒) and wonderful (美妙) etc., in groups and it took about 10 minutes.

After dictation, there was the fourth part of post-test which was referred to

drawing recognition. In this part, only participants in experimental group were asked to

recognize their drawings (which were the representations of SCs) in person. The

researchers would like to show participants' drawings and ask them to choose the SC

that they represent in their pictures from a set of Chinese scrabbles. It took about 10

minutes each person.

Elementary participants joining this study completed all assignments in class.

Before they participated in the study, they were requested to sign names to consent on

the answer sheets of pre-post test. Those who agreed to participate in this study had the

right to terminate their study in any time. There were at least two research helpers ready

to assist in case the participants encounter any difficulties and take care of other

participants. Tasks in this study were summarized in Table 3.

Table 3- *A Table of List of the Study*

Tasks	Test mode	Time spent	Content of tasks
Test of Chinese language knowledge	In person	About 5 minutes	Test participants' understanding the meanings of Chinese characters in semantic, phonetic and writing aspects
Pre-test	in groups of 10-20 participants	About 10 minutes	Test participants' 1.) Understanding of the meanings of R and the structure of semantic-phonetic compounds 2.) Understanding of the usage and meaning of target characters
Teaching	in groups of 10-20 participants	About 30 minutes	1.) Six target characters were taught (抄、秒、妙、沙、炒、吵) 2.) learning in drawing (in experiment group)
Post-test	in groups of 10-20 participants	About 10 minutes	Test participants' 1.) Understanding of the meanings of R and the structure of semantic-phonetic compounds 2.) Understanding of the usage and meaning of target characters 3.) Dictation of the target characters
	In person	About 10 minutes	4.) Pictures recognitions (Only experimental groups)

2.3 Experiment Materials and Measures

The materials were provided to the participants. All tests (TCLK, pre-post test) and learning materials and a sheet of paper for dictation were printed in A4 paper (210 mm X 297 mm).All students used pencil to do both tests and drawing. A set of Chinese scrabbles was provided to each participant to be tested in the post-test. An invitation and consent letter to parents is shown in appendix 6.

2.3.1   The test of overall level of Chinese language knowledge (TCLK)

This test aimed to test the over level of children's Chinese language knowledge. To fulfill the level of primary one pupils' Chinese language knowledge, this test was modified based on the Hong Kong specific learning difficulties checklist from Hong Kong Education and Manpower Bureau for primary one pupils. To focus on my study's topic, the Chinese part of checklist was mainly used and modified which tested the reading and writing ability of pupils, especially the understanding and the use of left-right structured characters. The Cronbach's Alpha reliability coefficient was.77. This test contained six major questions:

1.) Can the child select the proper character to form a term?

(例子：試選出習摜/慣。)

2.) Is the child able to choose an appropriate term to form a sentence?

(例子：請選取所提供的詞語配成句子 – 我收到爸爸送給我的＿＿＿＿。)

3.) Is the child able to select the appropriate SC to form a term?

(例子：試選出「眼」的形旁目/ 日 ?)

4.) Is the child able to read out simple Chinese characters such as bright(明), clear (清),

ground(地) and water(水) ?

5.) Can the child read aloud the simple sentences?

(例子：試讀出這句子 - 小弟弟在家中幫媽媽打掃。)

6.) Is the child able to write basic terms which teacher dictates such as school (學校) or

playground (操場)?

2.3.2.   **Pre-post test**

2.3.2.1   Understanding the meaning of radicals of Chinese characters

In the pre-post test, children were tested their understanding of the meaning

of semantic radicals of Chinese characters. Five common semantic radicals were set as

questions (扌、女、口、火、氵). For example, girl (女) was used as a semantic radical

of Chinese characters commonly. The participants were asked to match the meaning of

this semantic radical (女). There were five questions in this part. The Cronbach's Alpha

reliability coefficients of pre-test and post-test were .88 and .93 respectively.

2.3.2.2   Understanding the structure of semantic-phonetic compound

In the pre-post test, children were tested whether they understand the

structure of ideophonetics. The structure of semantic-phonetic compound includes the

semantic components(SC,形旁), phonetic components (PC,聲旁) and radicals (R,部首)

(e.g. the semantic-phonetic character 指 (finger): its semantic component 扌, phonetic

component 旨 and radical 手/扌). In the case of 指 (finger), the semantic component

and radical of that character are the same 扌(手 hand). There were six questions in total.

Participants were asked to re-write the semantic component, phonetic component and

radical of the characters. To cite an instance, the character (哈) which means to smile

with pronunciation /Ha/ was shown in the question paper. The participants were asked

to re-write the semantic component (口), phonetic component (合) and radical (口) of

the character on the same paper. The Cronbach's Alpha reliability coefficients of pre-test

and post-test were .88 and .93 respectively.

2.3.2.3   Recognition of Chinese characters

In the pre-post test, children were tested their ability to understand the use

of SC of Chinese characters which had been taught. In this part, six questions were

included. To cite an instance, wonderful (美妙) was used in a question. The SC (女)of

妙 was covered on the question paper. The participants were asked to put the suitable SC

into the provided Chinese terms from 3 different SCs (女、扌、忄.). The Cronbach's

Alpha reliability coefficients of pre-test and post-test were .88 and .93 respectively.

2.3.2.4   Understanding the meaning of Chinese Characters

In a part of pre-post test, children were tested their ability to understand the

compound words used in the sentences. Six questions were contained in this part. For

instance, 'We should not copy from other's homework. (我們不應該＿＿(抄)寫功課。)'

was used as a question. In this question, the character '抄' was omitted and the

participants were asked to choose the suitable characters to fill into the blank of this

sentence from several choices. The Cronbach's Alpha reliability coefficients of pre-test

and post-test were .88 and .93 respectively.

2.3.2.5   The production of Chinese Characters which had been taught

To test whether the participants can produce the Chinese characters which

had been taught in teaching part, children were tested their ability to write all six

characters which teacher dictated after their learning of those characters in a part of

post- test. For instance, 'Fried rice' (炒飯) was one of the characters for participants'

dictation. In this part, the numbers of characters which each participant wrote correctly

were mainly focused on. The Cronbach's Alpha reliability coefficients of post-test

was .933.

2.3.2.6   The picture recognition

The picture recognition aims to test children's memory whether they can

recognize the representations of their drawings. This part was conducted to participants

in experimental groups after the part of dictation and it was about a 15- minute delay

after the time they finished their drawings. In this part, participants were asked to

recognize their drawings (which were the representations of SCs) in person. The

researchers would like to show participants' drawings and ask them to choose the SC

that they represented in their pictures from a set of Chinese scrabbles. All drawings of

each participant were tested.

2.4   Data Analyses

The criteria of judging the performance of participants is to mark their final

answers which are right or wrong. Each right answer is given one mark and wrong

answer is given zero. Any answers would be regarded as wrong if those were not the

same as the standardized answers. The maximum score of TCLK was 31 and the

maximum score of pre-test or post-test was 39. All scores were marked by the

researcher and all of them were analyzed mainly by paired sample T-tests and

independent sample T-tests to test the difference of mean scores which participants

obtained in the tests within and between the groups respectively in this study.

Chapter 3. Results

3.1   Background Information

71 participants were divided into 3 groups where 33 participants belonged

respectively to experimental group (drawing) and control group (no drawing), while the

remaining 5 participants were in experimental group (drawing (dyslexics) . As shown in

graph 3.1 and 3.2, 13 boys and 20 girls were in experimental group while 14 boys and

19 girls were in control group. In the group of dyslexic pupils, there were 3 boys and 2

girls. All participants were aged around 6-7 and have finished the screening test, pre-test

and post-test in this study.

Figure 1- Number of participants by groups and gender
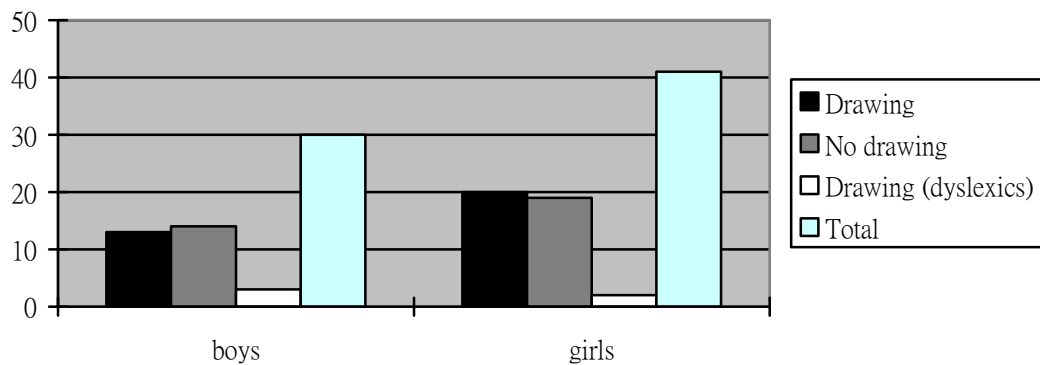
Figure 2- Number of participants by groups and age
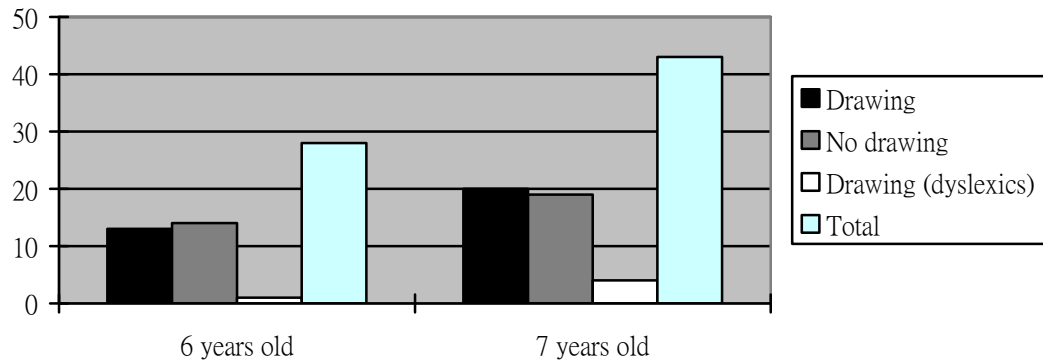
3.2 General Results of the Effectiveness of Drawing in Learning Chinese

Characters

Paired sample T-tests which compared the means of total score of all

participants obtained in pre-test and post-test were performed and significant differences

were found (t (70) = 12.22, p<.05, two-tailed). The significant mean differences were

found among participants in three groups such as drawing group (t (32) = 7.92, p<.05,

two-tailed), no drawing group (t (32) = 8.71, p<.05, two-tailed) and drawing (dyslexic)

group (t (4) = 5.01, p<.05, two-tailed), after the teaching part. Details of the means of

total score each group of participants obtained in pre-test and post-test are shown in

Table 1 (see below). Independent sample T-tests show that the mean differences in

post-test between drawing group and no drawing group were significant (p<.05).

These results indicate that the effectiveness of drawing in learning

semantic-phonetic characters is prominent both in the repeated measures comparison of

participants in three groups and comparison between the groups with and without

drawing.

3.3. Pre-Post Test

In pre-post test, participants were tested their understanding of learning with

and without drawing. The test mainly included four parts and descriptions of each part

as follows:

Part1a: Children's understanding the meaning of radicals (R) of Chinese

characters(扌、女、口、火、氵)

Part 1b: Understanding the structure of semantic-phonetic Chinese Characters

(e.g. please re-write the semantic component (e.g. SC 扌), phonetic

component (e.g. PC 旨) and the radical (e.g. R 手/扌) of the character

指)

Part 2a: Usage of semantic radicals in semantic -phonetic characters

(e.g. 美 __少(妙), 女、扌、忄)

Part 2b: Understanding the meaning of Chinese Characters

(e.g. 我們不應該___寫功課。)

In post- test, there were results of two more parts which were Part 3- the

dictation of those target characters (抄、沙、吵、炒、妙、秒) and Part 6- picture

recognition. Part 3 aims to test whether the participants can produce those characters

after learning without copying them. Part 4 aims to test participants' memory whether

participants can recognize the representations of their drawings after short delays of

about 15 minutes. After dictation, drawing recognition was conducted to each

participant in experimental group. In this part, participants who had learnt with drawing

were asked to recognize their drawings (which were the representations of SCs during

the teaching part) in person. The researchers would like to show participants' drawings

and ask them to choose the SC that they represented in their pictures from a set of

Chinese scrabbles. Table 4 shows the means scores of each part in pre-post tests among

three groups and the results of each part are described as follows.

Table 4 *Means Scores of Each Part in Pre-post Tests among Three Groups*

Each part of pre-post tests	Drawing	No drawing	Drawing (dyslexic)
Part 1a			
Pre-test	3.64	1.88	2.8
Post-test	4.03	4.12	4.6
Part 1b			
Pre-test	3.58	2.76	5.6
Post-test	14.06	7.76	14.6
Part 2a			
Pre-test	3.3	4.18	2.2
Post-test	4.30	5.33	4.8
Part 2b			
Pre-test	3.6	3.1	2.4
Post-test	5.24	5.33	6.4
Part 3			
Post-test	4.12	4.94	4

3.3.1   Understanding the structure of semantic-phonetic Chinese Characters

(Part 2 in pre-post tests)

This part refers to how participants understand the structure of semantic-phonetic characters. The structure of semantic-phonetic characters includes the semantic components (SC 形旁), phonetic components (PC 聲旁) and radicals (R 部首) (e.g. the semantic-phonetic character 指: its semantic component 扌, phonetic component 旨 and radical 扌).

As Table 5 shown (see below), the means scores on understanding the structure of semantic-phonetic characters based on the knowledge of SC, PC and R in pre-test among three groups are low. The poor Children's knowledge of understanding the semantic components (M = 0.51) and understanding especially in phonetic components (M = 0.08) was found. This result obviously reveals that this kind of knowledge, the phonetic and semantic components, is not taught to primary pupils obviously.

Paired sample T-tests which compared the mean of score on understanding the structure of semantic-phonetic characters in post-test were performed on all participants and significant differences were found (t (70) = 9.53, p<.05). After the explanations of the structure of semantic-phonetic characters during the teaching part, the ability of children's recognizing of semantic components and phonetic components

improved. Details in the means between pre–test and post-test were shown in Table 3.2

as well.

Although the outcomes of all participants have improved to understand the

structure of semantic-phonetic Chinese characters after learning. One of the significant

findings in the effectiveness of drawing in understanding the structure of

semantic-phonetic Chinese characters among pupils is confirmed. Independent sample

T-tests show that the mean differences in post-test between drawing group and control

group were significant ($p<.05$). These results show that the effectiveness of drawing on

a designed paper in learning semantic-phonetic characters are supported when

comparing to the group without drawing. A designed A-4 paper is divided into two parts

in horizontal. During learning the target characters, children drew a picture to represent

the semantic component of that Chinese character on the left side of paper which is next

to the printed phonetic component on the right side of paper. This new learning

approach with the focus on the structure of characters may help children to recognize

the structure of characters.

Table 5 - *Means of Scores on Understanding the Structure of Semantic-phonetic*

Characters in Pre-post among Three Groups

Means scores	Drawing	No drawing	Drawing (dyslexic)	Total
Understanding the radicals				
Pre-test	3.24	2.09	3.8	2.75
Post-test	5.36	4.97	5.2	5.16
Understanding the semantic components				
Pre-test	0.33	0.58	1.2	0.51
Post-test	4.60	1.33	5.2	3.13
Understand the phonetic components				
Pre-test	0.00	0.09	0.6	0.08
Post-test	4.09	1.45	4.2	2.87

3.3.2   Recognition of target characters (Part 3 in pre-post tests)

In this part of pre-post tests, participants are requested to choose a suitable

semantic component to form a correct character e.g. choose one of the semantic

components 女、扌、艹 to answer the question-美 __少(妙). All tested characters in

pre-post tests were taught in the study.

Paired sample T-tests which compares the mean of participants obtained

within pre-post tests were performed on the three groups of participants and significant

differences were found (t (70) = 6.312, p<.05). The mean differences were found among

participants in three groups such as drawing group (t (32) = 3.32, p<.05, two-tailed), no

drawing group (t (32) = 4.82, p<.05, two-tailed) and drawing (dyslexic) group (t (4) =

4.33, p<.05, two-tailed) after the teaching part.

Independent sample T-tests show that the mean differences of scores on pupils' recognition of Chinese characters in post-test between drawing group and control group were significant (p<.05). These results show that the effectiveness of drawing in learning those targets characters are confirmed. They indicates that the ability of pupils' recognizing several similar forms of characters (e.g. 抄、沙、吵、炒、妙、秒) which have different semantic components and same phonetic components can be improved by using drawing when they learn the structure of this type of characters.

3.3.3   Understanding the meaning of radicals of Chinese characters

(Part 1 in pre-post tests)

Paired sample T-tests were also performed on the drawing group and the group with dyslexics respectively and insignificant differences were found (t (32) = -1.32, NS; t (4) = -1.86, NS). It is because nearly half of the children in drawing group and dyslexic group understand the meaning of R before learning. This result reflects some of the pupils from primary 1 and 2 may have some knowledge of the meaning of R. It is because the meaning of R (e.g. 扌 refer to the meaning of 手 hand) is easily understood by children and some of them have clearly learnt before. However, the prevalence of participant' understand the meaning of R is not high. The possible implication of this result is that participants may not learn the meaning of R explicitly in

school or in family.

Independent sample T-tests show that there is no mean difference of

understanding the meaning of semantic radicals of Chinese characters in post-test

between drawing group and control group. These results indicate that there is no

significant difference between children learning the meaning of semantic radicals

through drawing or just being given verbal instruction by the researcher.

3.3.4   Understanding the meaning of target characters

In this part, participants were asked to fill in the blank from choices e.g. 夏

天到了! 陽光普照的_____灘，顯得格外迷人。To compare the difference of

participants' understanding the meaning of Chinese characters before and after learning,

paired sample T-tests were performed on all participants and significant differences

were found (t (70) = -7.41, p<.05).

However, there is no significant difference of comparison between the

means of scores on understanding the meaning of Chinese characters among drawing

group and control group performed by independent sample T-tests. These results show

that the effectiveness of drawing in learning the meaning of characters is not manifest

comparing with learning without drawing. This may imply that only drawings of the

meaning of semantic components cannot let children understand the meaning of

characters.

Independent sample T-tests were performed on each question among drawing group and control group. An interesting finding which is only one significant difference of the means score on question 7 in post-test was found ($p<.05$). Question 7 is 'a teacher uses timer which records by second to take a running record' (老師用＿＿＿ (秒)鐘紀錄跑步的時間。). More than 60% of participants both in drawing group and control group were not able to give the correct answer 秒 (second) in this question in pre-test. It is believed that some of them have not known this character before. After learning, more than 70% of participants can answer this question correctly and significant difference among two groups in post-test was found. Compared with 秒 (second), children may be more familiar with the other characters (抄、沙、吵、炒、妙). This explanation is supported by the result of scores on recognition of characters in pre-test, more than 60% of all participants were able to recognize the characters(抄、沙、吵、炒、妙), except the character 秒. Only 40% of all participants can choose the correct semantic component to the character. Therefore, the only significant result of the character 秒 may reflect that drawing may be effective in learning the meaning of some characters which children may be unfamiliar with.

3.3.5   The production of Chinese characters (Part 5 in post-test only)

The aim of dictation of those target characters (抄、沙、吵、炒、妙、秒) in post-test is concentrating on whether the participants can produce those characters after

learning without copying them. The types of errors that children had made do not focus

on analysis here because this is not the main concentration of this study.

Nearly 50 % of all participants can produce all target characters correctly.

Independent sample T-tests show that there is no mean differences of scores on

children's writing in post-test between drawing group and control group (p>.05). These

results show that the effectiveness of drawing in learning to write is not obvious

comparing with that of control group.

3.3.6   Pictures recognition (Part 6 in post-test only)

After the part of dictation, pictures recognition was the part of post-test

which only experimental participants (with drawing) took part in. In this part,

participants were asked to recognize their drawings (which were the representations of

SCs) in person. About 98.6% of participants can remember what their drawings

represented for. Only a dyslexic boy failed to choose one of the correct answers. These

findings reveal that children can remember what they drew and understand the

representation of their drawings.

3.4   The Test of Chinese Language Knowledge Test (TCLK)

3.4.1   The total score of TCLK

All participants have finished the test of Chinese language knowledge

before the main study. The test aims to analyze the overall level of Chinese language

knowledge among participants. This test focuses on testing children's recognition

semantic-phonetic characters (e.g. 寧 靜/淨 peaceful), usage of radicals (e.g. _亭留,

亻、彳), understanding the meaning of compound words (e.g. 我收到爸爸送給我的

_____。), pronunciations of single words and sentences (single words e.g.清、地;

sentence e.g. 小弟弟在家中幫媽媽打掃。) and dictation of Chinese characters (e.g. 說

話、唱歌).

Figure 3 and table 6 show average means scores of participants with and

without dyslexia obtained in TCLK. Mean scores in control group, drawing group and

drawing (dyslexic) group are 22.24, 22.64 and 18.4 respectively. Independent sample

T-test shows that the mean differences of total scores on TCLK between participants

with and without dyslexia are significant, $t(69) = 2.01$, $p<.05$, two tailed. This result

shows that there is a significant mean difference on scores of overall level in Chinese

language knowledge between elementary pupils and dyslexic pupils, among whom

those dyslexic participants acquire lower mean scores. This result also shows the level

of Chinese language knowledge is similar among participants without dyslexia in

drawing group and control group.

In addition, the scores of four dyslexic children obtained in TCLK are

respectively 10, 14, 18 and 20, which are lower than the mean (22.15) of all participants.

After all, it is surprising that a dyslexic boy obtained 30 scores in this test. Scores below

or above averages of all participants in each part of the Chinese language knowledge

test are shown in distributive percentages in Table 7 (see below) and the results of each

part of the test are described in the following sections.

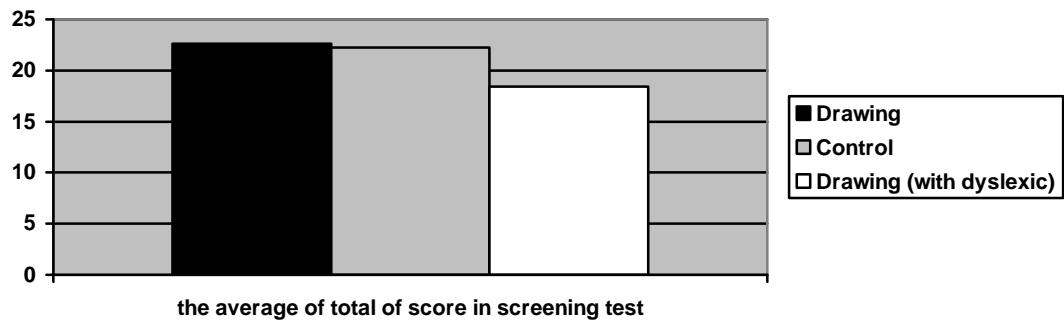*Figure 3* – The average of scores in Chinese language knowledge by groups

Table 6 - *Means of Total Score in the Test of Chinese Language Knowledge Among*

Participants With and Without Dyslexia

	Participants without dyslexia	Participants with dyslexia
The total score of screening test	M= 22.44 N=66 SD=4.07	M=18.4 N=5 SD= 7.54

Table 7- *Scores Below or Above Averages of All Participants in Each Part of the*

Chinese Language Knowledge Test

Each part of a test of Chinese language knowledge	Below the average	Above the average
Recognition semantic-phonetic characters (e.g. 寧靜/淨 peaceful)	38%	62%
Usage of radicals (e.g. _亭留, 亻、彳)	47.9%	52.1%
Understanding the meaning of compound words (e.g. 我收到爸爸送給我的_____。)	15.5%	84.5%
Pronunciations of single words (e.g.清、地)	9.9%	90.1%
Pronunciations of sentences (e.g. 小弟弟在家中幫媽媽打掃。)	38%	62%
Dictation of Chinese compound words (e.g. 說話、唱歌)	43.7%	56.3%

3.4.2   Recognition of semantic-phonetic characters

38 % of participants scored below average on recognizing correct

semantic-phonetic characters. They were not able to differentiate semantic-phonetic

characters with same phonetic components and different semantic components. For

example, more than 80% of participants were not able to recognize the meanings

between 渴(thirsty) and 喝 (drink or shout). The weakness of recognition of similar

forms of characters was apparent among the elementary children. However, in the result,

pupils were more accurate in recognizing the characters e.g. 靜 (青) and 淨 (氵),

nearly 70% of participants could differentiate them from the question- 寧 靜/淨

(peaceful). It is because compared to the radicals of other questions [such as 渴(thirsty)

and 喝 (drink or shout), 慣 and 摜, 技 and 忮, those characters 靜 and 淨 , 青 and

氵 may have more obvious difference. As a result, the character 靜 is more distinct

from 淨 and hence it is easier for pupils to recognize them.

Independent sample T-test shows that the mean differences of scores on this

part between participants with and without dyslexia were significant, t (69) = 3.23,

p<.05, two tailed. This result shows that dyslexic pupils have poor skills in recognizing

the semantic-phonetic characters with same phonetic components and different semantic

components. The forms of those characters are similar. It is easy to confuse dyslexic in

differentiating them.

3.4.3   Usage of radicals

Only 8 participants (11.3%) could answer all questions correctly in this part.

Four paired tested radicals including 1.)日、目; 2.)亻、彳; 3.) 忄 、扌; 4.) 冫、氵 have

similar appearance, but each of them has different meanings. About 47.9 % of

participants obtained scores below average in this part. The result shows that elementary

pupils may be confused in recognizing the semantic radicals because they were weak in

choosing the correct semantic radicals to the characters.

In addition, the weakness of dyslexic participants choosing those semantic

radicals was also found in the results. 80 % of them (4 dyslexic participants) acquired

scores below the average of all participants. Although participants without dyslexia

obtained higher mean score than dyslexic participants, there is no significant mean

difference of scores between two groups. It shows that the ability of recognizing the

semantic information of characters among participants is weak.

3.4.4   Dictation of Chinese compound words

In addition, participants also had difficulty in the production of written

characters which are composition of semantic and phonetic components. 40.9 % of

participants without dyslexia could not produce above the average correct written words,

that the level of those words is similar to the level of Chinese curriculum in Primary one.

Some common errors of participants without dyslexia were found that children might

produce another characters which have similar form of the original ones (e.g. 操場→

橾場; 說話→ 說語). Moreover, they might omit parts of the characters (e.g. 說話→

說言; 洗澡→ 洗澡). The types of errors in children's writing are mainly described.

The research does not focus on analysis of those errors because this is not the main

concentration of this study, but this finding shows that children are less capable of

writing the common semantic-phonetic compounds.

Moreover, it was found that 80% of dyslexic participants could not produce

written characters as well. However, their errors of production of writing have

differences compared to those of participants without dyslexia. It was found that

dyslexic children might produce strange characters (e.g. 唱歌→ 罒唱 or 昌歌),

might omit parts of the characters (e.g. 唱歌→哥昌), might add or omit strokes (e.g.

唱歌→晿 歌)

3.4.5   Understanding the meaning of compound words

More than 80 % of all participants had no problems in choosing the

appropriate two syllabus words of three questions in the part. Even, 60% of dyslexic

group gave all correct answers. The result reflects that there is no big problem for

children understanding the characters with compound words.

3.4.6   Pronunciations of single words and sentences

More than 90% of participants without dyslexia and dyslexic pupils can

pronounce the common single characters including 清(clear)、明(bright)、地(ground)、

吃(eat). However, there were some difficulties in pronouncing the sentences accurately

among participants. 34.8 % of participants cannot pronounce all four whole sentences

accurately. It was found in common that they cannot pronounce the semantic-phonetic

characters such as 蝴、蝶、蜻、蜓、採. Those characters also have similar character shape.

That means pupils may not be able to pronounce the characters accurately due to their

similar patterns. One character 辛 was often pronounced as 勤 by participants. It is

believed that the character 辛 had not been taught among some of participants and they understood the meaning of 辛 in the sentence with the meaning of 勤勞 (hard-working), then it is easier for them to pronounce 辛 as 勤 because of their similar meanings.

Even more, 80% of dyslexic pupils cannot pronounce all sentences correctly. This result shows that the ability of dyslexic pupils in reading sentences may be weak as well.

3.5   Qualitative Findings in Drawing

The first finding in children's drawings is that some of the pupils in the drawing groups drew pictures of semantic radicals which is related to them. When I asked pupils what those pictures represented for, some of them reported that their drawings represented to themselves, especially in the drawings of radical 手(hand) and 口 (mouth). They drew their hands and mouths to represent those semantic components. It reflects that drawing is a self experience activity for children to express their own thinking on the paper.

It is surprising that some drawings on papers which belonged to some of the pupils in the "control group" were found. Although those drawings were not related to the meaning of semantic components which had been learnt by children, these findings imply children to make pictures spontaneously. It shows that drawing is an

activity that children are interested in.

Chapter 4. Discussion

4.1 General Discussion

   The aim of this study is to explore the effectiveness of pupils' drawing in learning Chinese characters. The results of the pre-test and post-test help to reveal that both elementary and dyslexic pupils can recognize more characters accurately after learning semantic-phonetic characters through drawing. With this new learning approach, children are allowed to understand the structure of semantic-phonetic characters, and to recognize characters without copying. It indicates that drawing is effective, especially in enhancing pupils' memories and understanding of semantic phonetic characters, if used in educational settings. In Chapter 1, the possibility of using drawing in educational settings for children's learning Chinese characters, as well as the relationship between drawing and memory are discussed. In Chapter 2, improvements of Hong Kong primary schools in teaching Chinese written characters are considered. Chapter 3 looks into the needs and the identification system of Cantonese-speaking dyslexic children in Hong Kong.

4.2   Children's Drawings in Learning

4.2.1   The effectiveness of learning Chinese characters through drawing

    Drawing can be an effective tool for pupils to learn semantic-phonetic Chinese characters. The Level of Processing Theory (1972) states that one can

understand and remember information better with deeper processing. Results in this study reveal that the "drawing group" (pupils taught by drawing) performed better than the "control group" (pupils were not taught by drawing). The "drawing group" showed better understanding in the structure of semantic-phonetic characters and the recognition of target characters. Many pupils of the "drawing group" drew pictures of semantic radicals related to them, such as drawing hands and mouths to represent the radical 手 (hand) and 口 (mouth). It reflects that drawing is a self experience activity for young children to express their own thinking on the paper. It is consistent to the property of deep level processing of stimuli. Thus, drawing is a valuable tool to process information deeply and enhances memories of understanding semantic-phonetic compounds. Even more, one of the important findings in children's memory is that most of the participants could remember what they drew after a short delay. Although this delay was just 15 minutes, this result supports that those children did not only understand what their own production represented for (Franklin, 1973), but they can also remember it after delays. This confirms that there is a relationship between drawing and memory. It implies that children's drawings are worth using in educational settings. Introducing drawing as a new learning approach (especially in the relationship between semantic and phonetic components) may even become a breakthrough for Hong Kong primary school pupils, who tend to learn with the traditional approach of copying.

4.2.2   Enhancement of learning the relationship between characters' graphic

symbols and their meanings through drawing

The relationship between characters' graphic symbols and their meanings

also enhance pupils' recognition of target characters through drawing. (Peng Chen,

Yung, and Ng, 1988). In this study, experimental groups were required to draw pictures

to represent meanings of semantic components of characters. Compared with the mean

scores of recognition of the target characters in the post-test, participants can obtain

higher mean scores significantly with drawing. This indicates that graphic

representations facilitate children's understanding, not only of the structure of characters,

but also recognition of characters. This finding is consistent with Hoosain (1991)'s

views that Chinese written language uses graphic symbols to represent the main units of

meaning. As a result, children can recognize more characters after learning the

relationships of graphic and semantic cues of characters. The close relationship of

graphic and semantic informations of characters is the important indicator for teaching

children to learn Chinese characters.

4.2.3   An increase of children's interest in learning through drawing

Pupils in the "drawing group" showed high interests in drawing when they

were observed in primary schools involved in this study. In the pre-test, some pupils felt

bored when they were unable to answer questions beyond their level of Chinese

knowledge. However, they became interested in drawing after the target characters were

taught. This phenomenon shows children's nature of like drawing. On the other hand,

some drawings were also found in some papers of pupils among the "control group".

These findings imply that children make pictures spontaneously. Drawing can enhance

their interests in engaging in tasks for learning. The implication of this point is that

Children's drawing can be applied in educational settings to avoid pupils, especially

those in primary one and two, feeling bored in learning. Children' drawings are used

commonly in different settings. For instance, in clinical approaches (e.g. reflection of

children's expression) or in entertaining aspects (e.g. pictionary, a game played in pairs

trying to identify assigned words from their partners.) But it is less used in educational

settings and, therefore should be strongly recommended to parents and educators in

order to make full use of children's interest in drawing and turn it into a device to

advocate their interest in learning.

4.2.4   Drawing enhances children's recall and leads their organization of thinking

Drawing has an important value in increasing pupils' abilities of writing (e.g.

producing ideas), in addition to learning how to write characters. Researcher's

observations show that many children like to express what they are going to draw or

explain what they have drawn. For example, a boy drew a picture of having a barbecue

with his family to represent the meaning of semantic radical (火, fire), and expressed the

scenario with his family on the day he drew. The act of drawing plays an important role

in facilitating their recalls of living and the things they know. Children's illustrations of

their drawings help to restructure their expressions. Drawings do not only serve as

graphic representations, but also a way of children's expression. This kind of expression

helps children to organize their thoughts; which is a preparatory step for developing

writing abilities (i.e. composition). This relationship between drawing and writing is

especially obvious in primary 1 and 2. Further studies are required to explore the

effectiveness of drawing in integrating writing texts.

4.3   Learning Chinese Characters

4.3.1   Pupils' poor understanding in the structure of phonetic - semantic characters

         This study reveals that pupils have poor understanding of structures of

phonetic-semantic characters. In the Chinese language knowledge test, more than 50%

of participants have poor skills in using semantic components in semantic-phonetic

characters, as well as recognizing phonetic components and semantic components in the

pre-test. They cannot understand the correlation of semantic information and

pronunciation of a character, implying some elementary pupils have not learnt or

understood the relationship between phonetic (e.g. 可 as PC of 呵) and semantic

components (e.g., 可 as SC of 呵) in school. One of the reasons is that teachers and

parents may not put emphasis on teaching such relationship to elementary school

children.

However, it is found that children can recognize more characters after learning the structure and meaning of phonetic - semantic characters. This study reveals that children understand phonological information by phonetic components, and semantic information by semantic radicals; knowledge of phonetic and semantic components help to improve children's recognition of semantic-phonetic characters. It is highly recommended that teachers and parents should explain structures of semantic-phonetic characters when children start to learn this type of characters.

4.3.2   Children's understanding of the meaning and usage of semantic components of Chinese character

Although outcomes of the "control group" were not significantly different from the "drawing group" in the post-test, we can see significant improvements (shown by differences of scores in pre-test and post-test) of recognizing Chinese characters among the "control group". Since the knowledge of structure and meaning of phonetic-semantic components of characters were focused on the "control group" in this study. This result supports previous research findings that elementary pupils can improve their ability of learning characters by learning knowledge of the semantic component and phonetic component (Ho, Wong & Chan, 1997). Therefore, pupils' abilities in understanding meanings and pronunciations of semantic-phonetic characters

are likely to increase after they learn the relationships between semantic and phonetic components.

4.4   Dyslexic Pupils in Hong Kong

4.4.1   The possible learning approach for dyslexic pupils

Although there were only five dyslexic participants in this study, some needs of children with dyslexia can also be seen. Dyslexic children have poor skills in determining pronunciation and semantic information of an ideophonetic character (Cheung, 1999), which further hinder their recognizing semantic-phonetic characters (especially those with similar structures). However, if dyslexic pupils are offered with proper help, their abilities in learning Chinese characters will be improved. From the significant difference of scores that dyslexic pupils obtained in part 3 and 4 (usage and meaning of semantic components of Chinese characters) of the pre-post tests, we can see how drawing, a proper strategy, can greatly help dyslexic pupils recognize target Chinese characters. Bell (1991) states that the use of picture imagery and word imagery can promote and enhance dyslexic's ability of reading, implying that drawing can be useful for dyslexic children's learning. A new possible learning approach of integrating drawing into learning should be introduced among Cantonese-speaking dyslexic students to help them learn the Chinese language.

4.4.2　　　The proper strategy in dyslexic children's learning

　　　　Results in this study show that dyslexic children often face difficulties in reading and writing. Comparisons with participants without dyslexia in this study show that writing is their weakest part. Their errors in writing, such as writing a strange form of characters (e.g. 唱歌→ 囂 唱 or 言哥可), omission of characters' parts (e.g. 唱歌→哥昌), wrong strokes (e.g. 唱歌→唱 歌), show that dyslexic pupils have poor recognitions and memories of character shapes.

　　　　Close observations of interactions with dyslexic pupils reveal their obvious reluctances to engage in writing-related tasks, which may be caused by their poor recognitions and memories of character shapes. However, after changing the questions from writing tasks to the simpler form of circling answers, matching, etc, they were more willing to finish the tasks, sometimes with devices such as Chinese scribbles and color pens. This reflects their unwillingness to write, implying that the traditional way of learning Chinese characters by copying characters is not appropriate to dyslexic pupils. Drawing, the new learning approach targeted in this study, is used as a device to enhance dyslexic pupils' interest in learning. The positive outcome of their learning reveals that they have easier times working out problems that can be pictured or manipulated in a three-dimensional way (Vail, 1990). Consequently, when teaching dyslexic children, it is essential to use appropriate methods, which can cater to their

needs and interests, instead of using traditional ways that are ineffective for their

learning progress.

4.4.3   The improvement on identifying pupils with dyslexia in Hong Kong

In this study, the test of Chinese language knowledge was used to test the

Chinese language knowledge levels of pupils 1 and 2. The significant mean difference

between scores obtained by participants with and without dyslexia is found; dyslexic

participants acquired lower mean scores. This result implies that it may be possible to

identify suspected cases of learning disabilities in learning Chinese language by

checking students' scores obtained in this test. This test is time-saving as it merely takes

about five minutes to assess pupils' overall Chinese language knowledge at an initial

stage. Although the reliability of this test is not high enough, it is necessary to conduct

similar assessments before children entering schools. The procedures of the current

assessment (the Hong Kong Specific Learning Difficulties Behavior Checklist for

primary school pupils 1) are time-consuming and take at least a year to identify students

who are suspected to have specific learning disabilities. If teachers assess their pupils'

learning ability through simplified test before the beginning of a semester, they can be

more aware of pupils' learning situations in class, and check these students with the

current assessment in the first semester. Time is saved this way, and the result of

suspected cases can be referred to professionals for further diagnosis as quickly as

possible.

The earlier pupils with dyslexia are identified and diagnosed, the prompter they get additional supports to catch up their golden learning period. To cite an example in this study, a dyslexic boy was diagnosed before studying in primary school, and his parents had provided appropriate support in his learning. His scores obtained were higher than the mean of pupils without dyslexia in the test of Chinese language knowledge. To assist parents and teachers in identifying suspected cases of dyslexia, simplified checklist could become handy in assessing children's learning abilities.

4.5   Limitations of Study

4.5.1   Limitations of the design of learning approach with drawing in learning

Drawing the meaning of semantic components of characters may improve children's understanding of the structure of semantic-phonetic characters. However, in this study, the design of this learning approach with drawing is only suitable to draw something which has concrete meaning. It is inadequate to investigate different meanings of semantic components or radicals of characters. For example, the meaning of semantic components (禾 grain) of the semantic-phonetic compound 秒(second) is more abstract than other meanings of SC (e.g.日 the sun , 女 a girl). It is difficult for pupils to represent them in pictures at the beginning stage before they understand the

meaning of semantic components. Therefore, the design of learning in drawing cannot

investigate the effectiveness of drawing in learning Chinese characters if the meaning of

objects is unfamiliar or abstract.

In addition, some pupils in experimental group overly engaged in drawing.

Therefore, if the researcher did not notice this situation and kept on giving instructions,

children might be distracted by their act of drawing and ignored the explanations given

by the researcher. Therefore, it is valuable to remind this point and the researchers or

educators should be aware of manipulating the time and settings for using children's

drawing.

4.5.2   Limitations of learning Chinese characters in this study

The numbers of Chinese characters are appropriate for pupils to learn during

the course of the class. However, it is not objective to investigate only a group of

semantic-phonetic compound characters (抄、沙、吵、炒、妙、秒) to represent the type

of semantic-phonetic compound in this study. However, numerous semantic-phonetic

compounds and different types of Chinese characters are yet to be explored. Besides the

types of semantic-phonetic characters, the remaining 20% of Chinese characters include

pictographs (e.g. 日、月), associative compounds (e.g. 武、信), ideograph (e.g. 上、

刃), phonetic loans (e.g. 老、考) and synonyms (長、令). Surely there are doubts in the

problems on children's learning Chinese characters if the other types of characters can

also be applied in this study. Further studies on the effectiveness of drawing in learning

different types of Chinese characters are necessary.

4.5.3   Limitations of the pre-post tests

To avoid confounding variables between the pre-post tests in this study, the

researcher should conduct post-test after children have learnt all target characters.

However, longer delays between the pre-post tests can test whether the effectiveness of

drawing in learning will be affected on children's memory. This refers to the ability to

retrieve information of things learnt in the past according to the length of period.

However, in this study, the delay between the post test and the productions of drawing

was short and therefore it may not be very effective to explore the relationship between

the memory and drawing.

Since all of us know that better memory is considered a necessity to achieve

successful learning. The results of this study are just confirmed that drawings, as a

deep- level processing activity, enhance children's understanding and memory.

However, it is not dealt with to test how depth of drawing in level processing. If this

study conducted the post -test again after longer delay, it would strongly enhance the

exploration of the level of the effectiveness of drawings in learning Chinese characters,

especially the structure of semantic-phonetic characters, and evaluate whether drawing

becomes an effective processing system for remembering after the period of delay.

4.6　　　Further Studies

The research summarized with some questions for further studies. The questions are raised as follows:

1. Can a child draw the semantic components more abstract for enhancing their ability to learn Chinese characters which have more complex forms?

2. Can any other types and structures of characters be used in children drawings?

3. Can children drawing use in other educational settings for enhancing pupils' motivation to learn?

4. Are there any other assessments for identifying dyslexic at the initial stage?

5. Can drawing be effective in helping dyslexic pupils in other developments?

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