Linguistic Interdependence and Educational Development: A Comparative Study of Regular and Bilingual Schools in Taiwan

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DECLARATION

I declare that the thesis entitled

"LINGUISTIC INTERDEPENDENCE AND EDUCATIONAL DEVELOPMENT: A COMPARATIVE STUDY OF REGULAR AND BILINGUAL SCHOOLS IN TAIWAN" submitted by me for the award of the degree of **Doctor of Philosophy** of Jawaharlal Nehru University is my own work. This thesis has not been submitted for any other degree of this University or any other University.

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CERTIFICATE

We recommended that this thesis be placed before the examiners for evaluation.

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L1	First Language; Native Language
L2	Second Language; Foreign Language
EFL	English as a Foreign Language
NETs	Native English teachers

Chapter 1 Introduction

Language serves not only as a tool for communication but also as a psychological tool in developing an individual's cognitive processes. Most human activities involve a mediated process that functions to establish an indirect or mediated relationship between ourselves and the world. Human’s mental activity is mediated by psychological tools such as numbers, signs and language to direct and regulate their mental behaviour. Language plays a pervasive role in developing basic cognitive tools as well as higher order mental processes such as voluntary attention, intentional memory, planning, logical thought and problem solving which in turn play a central role in the learning of children in schools. Many teachers use semiotic tools manifested through language use, such as reading aloud, repetition and children’s first or the strongest langauge as enabling tools that have developmental repercussions in our cognitive capabilities, particularly in the learning of a second or foreign language.

All children acquire their first language while growing up in a socio-linguistic community in early years without any formal teaching. Literacy activities like reading and writing requires additional tools like teaching and learning. The reading and writing activities in the first language builds on the oral resources already acquired in that language. Whereas, learning a second language in a school setting is different from learning a first language. As the young learners have normally already developed their L1 system as a regulatory tool for their basic cognitive activities like sorting, categorizing, naming etc. in the first languages, the learning of second language requires linguistic scaffolds from the first language. Socio-linguistic studies show that the children as well as the teachers often code switch or translanguage so

that the learning of new language is founded on the already acquired metaphorical, lexical and syntactic structure of the first language. The metalinguistic resources acquired in the first language help in the acquisition of the second language. Such a mediation is necessary if it is a foreign language.

Extending these ideas, Vygotsky and the post Vygotskyan scholars like Lantolf, Gánem-Gutiérrez & Harun propose that while the first language functions as a mediational tool to aid the learning process of the target L2, the learners also benefit from the restricting role that L2 plays in the reorganization of the knowledge of L1. The problems arising from learning of L2 creates a specific kind of comparative linguistic reflections on the nature and the structure of the first language itself provided the children have the autonomy to use their already acquired linguistic and metalinguistic resources. In a free and socio-linguistically porous environment, through the foreign or L2 instruction, it is assumed that the learners may develop an enhanced understanding of their native language that complements and also enhances their L1 reading and writing instruction. The intervention programmes that assume the linguistic systems to be porous and create a space for L1 scaffolding the learning of L2, the children not only learn the reading and writing in the second language better, they also do better in science and mathematics task. In otherwords, the use of language L1 provides learners with additional cognitive support in solving the second language L2 linguistic tasks while L2 creates a deeper level of metalinguistic reflections in L1 especially. They begin to formally discover the very nature and the structure of a language and appreciate the fluidity of languages.

Several investigations done within the Sociocultural theory of mind (SCT) in Africa, South and South East Asian countries show how the use of L1 as a semiotic mechanism in mediating learners' understanding of the English (L2) tense-aspect system result in better learning of L2. It also enhances the working memory of children, their cognitive differentiation skills, self confidence, and the meta-linguistic and meta-mathematics resources in both L1 and L2. However, in recent time, the lure of acquiring the native like English speaking skill has pushed this understanding of the relationship between child's mind, language and the self to the hind sight. Many non-English speaking Eastern societies want their schools to immerse their young children in English even if it is not one of their strong language. The situation in countries Taiwan is therefore complex as a section of Taiwan population is aspiring its children to acquire native like spoken English skill right from class I inviting native

English speaking teachers from countries like UK, Australia, South Africa etc. who have no understanding of children's language as well as home culture. Such a decision is feared to influence negatively the development of metalinguistic resources and therefore the basic cognitive resources for learning of mathematics and science concepts well. The present study therefore aims at comparing the students' academic performance in L1 Chinese Mandarin and L2 English and in Mathematics.

The Sociolinguistic Context of Taiwan and School Learning:

The situation in Taiwan is slightly different. In Taiwan, Mandarin Chinese is the primary language, with English playing the role of a foreign language. Being a strong global contact language, English is not only a compulsory subject taught in school from the junior high level, but also the languages that most people in Taiwan gravitate towards learning now. In line with the global trend of early introduction of foreign language learning, the Taiwan government decided to include English in the curriculum in government-run elementary schools from class V onwards in 2001. Recently, some local schools start teaching of English from the third grade and while few others start right from the first grade itself.

The official introduction of early English language learning in government-run elementary schools was a major change in Taiwan's educational policy in last two decades. In response to these changes in the state's policies and the rising parental aspirations for English education, several private players started bilingual schools where instruction is imparted in both Mandarin Chinese (L1) and English (L2). All such schools in Taiwan have two common features: (*a*) L1–medium and L2-medium bilingual programmes starting from the first grade; and (*b*) Mandarine Chinese speakers teaching in Mandarine Chinese classes while the native English speakers teaching in the English-medium classes.

Given that most students in Taiwan are unable to reach a satisfying English proficiency level with the existing system of English being taught as a subject, 72 per cent of parents are keen to have their children learn in English medium schools (Lihpao 2004). Around 69.2 per cent of parents believe that using English to teach non-language school subjects will help their children meet two goals—subject learning and English proficiency (Din 2005). As a result, despite the high tuition fees

demanded by these private schools—43 to 62 times higher than government-run elementary schools (Lin and Yang 2003)—private bilingual schools tend to be a preferred choice for the well-off population.

Bilingual programme is a method of instruction in two languages, usually students' first language and the target language. The target language is usually used as both the medium of instruction and curriculum content (Baker 2006). According to Baker (2006), there are three kinds of language immersion programmes depending on students' age when they enter the programmes: early immersion (age 5 or 6); middle immersion (age 9 or 10); late immersion (from age 11 to 14). In Taiwan, students begin schooling at the age 6 or 7, so elementary-level bilingual schools in Taiwan can be categorized into early immersion.

Studying a foreign language tends to help students develop a better understanding of their first language (Cumming-Potvin, Renshaw and van Kraayenoord 2003), enhance cognitive abilities, and positively influence academic achievement in other subjects (Stewart 2005). However, if the native language instruction is not well developed and attempts are made to introduce a second language, progress in the latter will be impeded (Baker 2006). Concerns have been raised in Taiwan about the possible negative consequences of the overemphasis on English. Some argue that the growth of English is a threat to the local language and culture of Taiwan (Chang 2003; Cheng 2006; Ruan 1996). Early English learning is also blamed for bringing a negative impact on children's learning of Mandarin Chinese (MT) (Chuang 2004). In addition, children with limited English proficiency tend to not do well in English immersion programmes, which results in a negative impact on their confidence (Nien 2001). This implies that children who are not proficient in Mandarin Chinese should not be expected to learn English well. English instruction can also hamper learning in other subjects and the overemphasis on English influences children's perceptions of their native language and culture. In this context, it needs to be investigated if bilingual schools actually help children learn better.

In Taiwan, children learn English by way of "additive bilingualism" as defined by Cummins (1986) and Lambert (1980), which aims to learn the new language at no cost of the L1. Accordingly, the overall aim of the present quantitative and qualitative study was to examine how beneficial bilingual programmes are with regard to

proficiency in Mandarin Chinese, English and mathematics when compared with school programmes in which English is taught as a regular school subject and all other instruction is in Mandarin Chinese. This was accomplished by examining the strength of the relationship between proficiency in Mandarin Chinese and English, and mathematics. Furthermore, how students participate in the classroom in both regular elementary schools and bilingual schools was also examined. The broad sociolinguistic context of the study has been outlined in Chapter 1. In particular, it was noted that English learning has been promoted as an all-nation activity for years in spite of the fact that it has very limited practical use outside the educational system. A comprehensive review of relevant literature in this regard has also been included. Chapter 2 presents the research design. The research process was guided by cognitive theories of literacy development, and sociocultural theories of learning, language learning and literacy development. Classroom observations were also adopted to gain insight into teachers' approaches to language, classroom discourse and interactions, and these were analysed using inductive analysis and interpretive discourse analysis. This attempted to establish the nature of classroom discourse at the elementary level in both government-run and private schools. Specific research questions have been outlined in the chapter. In Chapter 3, the results of quantitative data are discussed and a clear picture of the ecological complexity of linguistic practices in both regular and bilingual schools has been presented. A discussion of the hypothesis along with a number of issues that emerged from the findings is presented in Chapter 4. A conclusion, along with implications for theory and practice, are the focus of the final chapter.

1.1 Taiwan Context

1.1.1 Education System in Taiwan

Since the early 1980's, Taiwan's fundamental educational system had consisted of 9 years of compulsory education: 6 years of elementary school and three years of junior high school. In 2014, Taiwan government extended this 9-year fundamental programme to 12-year fundamental programme by including three years of senior high school.

Children aged 7 have to attend six years of elementary school. The curricula for elementary school contain seven major areas of learning: language arts, health and

physical education, social studies, arts and humanities, mathematics, science and technology, as well as integrative activities according to Nine-year Integrated Curriculum Guidelines.

After six years of elementary school, children have to attend three years of junior high school. The curricula for junior high school contain similar areas of learning at elementary school. Some junior high schools provide students with technical courses in their last year of junior high in order to prepare them for skill-based senior high schools. From 2014, all students of the 3rd grade of junior high are required to attend the Comprehensive Assessment Program for Junior High School Students. Students will be guided to move to further study by the test results. Students have three choices: three years of regular senior high school, three years of skill-based senior high school and five-year skill-based junior college.

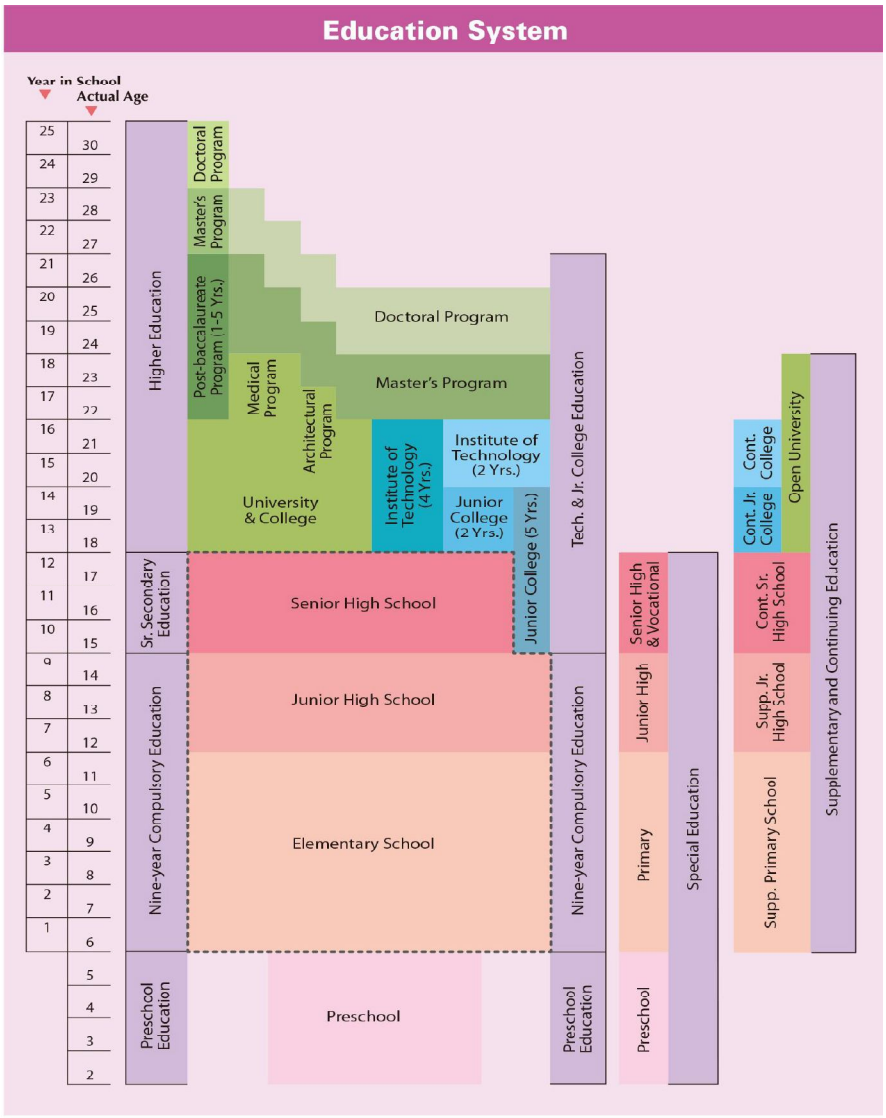
The three years of regular senior high school pave the way for higher academic education. The curricula for the regular senior high program include general subjects, such as language arts, mathematics, and the social and natural sciences. Students are encouraged to participate in more activities, such as extracurricular, competitions and international volunteers. Students' participation in such activities contributes to the possibilities of passing admission to university.

The three-year skill-based senior high programme and five-year skill-based junior college programme provide students with practical training in a specialized field or subject, including commercial, industrial design, technology, tourism, nursing and so on. Some specialized fields have certain licenses for students to take. Students with specialized licenses easily find a job. They may also pursue advanced study.

Students have varied channels to get access to college or university: recommendation, application, examination and placement. All senior high school students are required to sit for the General Scholastic Ability Test, which assesses their competence in subjects, such as Mandarin Chinese, English, mathematics and the natural and social sciences. Based on their test achievements, senior high school students gain admission to the college or university by getting the recommendation from their schools or directly apply to the department of the college or university as they prefer. Another way to get access to the college or university of their choice is to take an Advanced Subjects Test according to the requirements of the college or university.

In general, Taiwan offers four-year university programmes. Some

medically-related fields require more years to finish the course, such as school of medical. Those who finished the university program are awarded bachelor's degrees. After bachelor's degree, students may study for postgraduate programmes, including master and PhD programmes. The latter two degrees have to complete the required courses along with the submissions of a dissertation or a thesis. Broadly speaking, it takes one to fours years to complete a Master program while it takes two to seven to get a PhD degree.



---- Includes non-school mode of experimental education (such as homeschooling)
Source: Ministry of Education

Figure 1-1 Taiwan educational system

1.1.2 Diversity of language in Taiwan

Taiwan, a multi-ethnic and multilingual society, is an island with an area of

35,981 square kilometers and a population of about 23 million. This population consists mainly of four ethnic groups: the Mainlanders, the Taiwanese, the Hakka and the Austro-Polynesian aborigines. The percentage of the population of each group is as follows (Huang 1991, p. 21):

- *Taiwanese 73.7%*
- *Mainlanders 13%*
- *Hakka 12%*
- *Austro – Polynesians 1.7%*

It is very obvious that the Mainlanders do not occupy the most population. Due to the political reason, Mandarin Chinese has been promoted to become the national language of Taiwan. As a result, Mandarin Chinese is used as the primary language of instruction in government-run nursery, elementary schools, high schools and universities. However, a large segment of the population speaks Taiwanese (or Holo, variant of the Hokkien speech of Fujian province) and Hakka. One research (Chang & Lin 2005) made an investigation of the home language used in Taitun, the eastern part of Taiwan, where Hakka, Taiwanese and Austro-Polynesians occupy the majority of the population. It reports that Mandarin Chinese has become the major home language in the majority of families in this area. 89.4% of Hakka family uses Mandarin Chinese as the home language to communicate with their children while 7.9% of them choose Hakka as the home language. There are 86.4% of the Taiwanese families and 94.0% of the Austro – Polynesians families use Mandarin Chinese as the communication tool with their children. Mandarin Chinese has been promoted as the home language in most of the families in Taiwan. No matter Mandarin Chinese is or not children's home language, they all begin their formal education in Mandarin Chinese.

1.1.3 English in Taiwan

Growing significance of the dominant role of English in international communications, English becomes "linguistic imperialism" (Philipson 1997, p. 238). Kachru (1986) divided the status of English into Inner Circle, the Outer Circle, and the Expanding Circle. Taiwan is under Kachru's (1986) so-called expanding circle encompassing the countries where English plays no historical or governmental role, but a language other than a dominant language, Mandarin Chinese, spoken in the

society and in the home. English does not only attract the most Taiwan people to learn as the first foreign language, but also the only compulsory foreign language taught in the formal school level.

As English as the language of science and technology, news, trade and sports (Nunan 2003), English has been regarded as the most important foreign language in non-English-speaking countries (Li 2008). This is also the case in Taiwan. Calling for a more contacted with the world community and being aware of the trend of globalization, Taiwan's government has greatly highlighted the significance of English by way of conducting some initiatives to promote the learning of English. The initiatives to promote English learning were comprised of

•The launch of General English Proficiency Test (GEPT) for all English learners at all levels
•The establishment of the threshold for English proficiency for university graduates
• The establishment of Mandarin Chinese-English bilingual environments
• The promotion of EFL teaching for formal education at the beginning level

Development of General English Proficiency Tests (GEPT)

In accordance with the national policy, enhancing citizens' English proficiency is one of the major goals. Therefore, Taiwan's government also commissioned the Language Training and Testing Center (LTTC) to develop General English Proficiency Tests (GEPT) for five ability levels: Elementary, Intermediated, High-intermediate, Advanced and Superior.

Each level of GEPT incorporates four language skills: listening, speaking, reading and writing. A certificate of achievement will be awarded to those who pass any level of GEPT. The government encourages people to take the exams to get the certificates, which are accepted by government, education units and private sectors. The GEPT is the leading dominant English proficiency test in Taiwan. As a result, people are keen to study English in order to pass the test. More than 2.6 million people (22% of Taiwan's total population) took these exams from 2000 to 2008.

The threshold for English proficiency for university graduates

Since the establishment of the threshold for English proficiency for university graduates, to learn English and pass the threshold of English proficiency become one

of the most tasks for university students. To schools, how to strengthening students' efficiency of learning English also becomes their important task. However, there is no national syllabus for English teaching in university level. Instead, the Ministry of Education of Taiwan gives all universities more freedom to decide the level of the threshold of English proficiency for their undergraduate students according to each individual university's own policy (Gong 2009). In order to help students to meet the threshold of English proficiency, universities actively plan as well as provide the necessary resources required for English teaching and learning. Universities are mostly well-equipped with a variety of teaching and learning facilities, for example, audio-visual aids and scenario learning classroom. A lot of learning materials such as English books and English magazines are also available in universities.

Mandarin-English bilingual environment

Taiwan government also aims to create a friendly living environment for foreigners. Some important achievements include the introduction of English public signs and bilingual (Mandarin-English) street signs in big cities at large; the provision of bilingual websites of government agencies; establishment of foreigner service counters to offer English services to foreigners.

In order to establish a bilingual environment in the Capital of Taiwan, Taipei, to enhance the citizen's English proficiency and offer a friendly Mandarin Chinese-English bilingual environment, Taipei City Government launched the Establishment of Mandarin Chinese-English Bilingual environment in Taipei City Government Project, including Department/Bureau Titles, Personnel Titles, Offices and Public Places. This plays only a small role in Taipei policy of globalization.

The promotion of EFL teaching for formal education at the beginning level

The one among the initiatives attracts the most attention is formally getting English language course into the syllabus for elementary school in Taiwan. The majority of Asian countries had included English as a compulsory subject to the curriculum at the elementary level before the year of 2000 (Honna et al. 2004, cited from Honna & Takeshita 2005). Taiwan also follows the global trend in 2001. In other countries, the implementation of English teaching and learning tends to start from lower age (Chen & Fong 2000). In following this universal trend, in 1996, Executive

Yuan of Taiwan passed the "positive planning required appropriate English courses for elementary school students." In 1998, Ministry of Education of Taiwan announced “Grade 1-9 Curriculum Guidelines” and planned to introduce English to primary students, starting from the fifth grade and the above.

Before this, with the fact that English is the most powerful language in the world, English, a high-status foreign language, has been a required subject for students in junior and senior high schools in Taiwan for decades. The reason to have English class implemented into the elementary level was driven partly by the impact of globalization and partly by the common belief held in Taiwan context: earlier children lean English, better result it brings.

In 2001, the Ministry of Education of Taiwan decided to make English learning compulsory from the fifth grade and above of elementary school. Two 40-minute period of English learning per week is compulsorily implemented for students of the fifth grade and above. This is the first time that English is officially allowed to be taught in government-run elementary schools. Since then, English education has been carried out formerly in every elementary school of Taiwan. Furthermore, in 2005, under the pressure from parents, the government finally allowed students of the third grade and above to receive two 40-minute periods of English each week. Some local governments like Taipei city (capital of Taiwan) and Kaohsiung city (second big city of Taiwan) even lower the age of learning English in school to the first grade.

According to the Ministry of Education of Taiwan, the guidelines set up for English teaching at elementary level are as the follows:

1. the development of basic communicative competence in English
2. the improvement of the cultural understanding of Taiwan and foreign countries
3. the cultivation of students’ English learning motivation and strategies.

The English curriculum guidelines for English teaching for elementary schools are on developing basic communicating competences and understanding of social customs and culture through listening, speaking, reading and writing of English. English should be taught through communicative approaches and linked up with students’ real life, which helps students easily understand English. Besides, English learning must be in a pleasant environment to encourage them to learn. Students of government-run elementary school have two to four 40-minute sessions a week

whereas students of private elementary school have more English sessions a week. For the time being, each school is free to choose any edition used as an English textbook in the class.

This policy marks English learning in elementary level in Taiwan. It helps children formally access English much earlier than before. This policy also clearly indicates the perception in Taiwan: English proficiency means bright future for their kids and it is never too early to learn. This is what "critical period (Eric 1967) " refers to the proper timing for language learning. However, the "critical period" was not widely supported by the researchers of Taiwan. The issue of implementing English programme in elementary schools was argued for a long time.

The first issue raised is the sources of qualified teacher of English teaching at elementary level. In responding to this issue, the Ministry of Education of Taiwan has two plans to have teachers of English teaching. One is to hold exams for the potential English teachers and those who pass the exams will have one-year training programme. The other is to recruit English speaking teachers from overseas.

Another issue caught people's attention is the focus of English learning. It is clear announced by the Ministry of Education of Taiwan that the training for speaking and listening ability should be the first priority with subsequent skills, reading and writing. However, Taiwan's traditional paper-and-pencil-test-oriented system influences teachers' teaching method and students' learning strategies. As a result, in the classroom at elementary level, teachers spend more time on grammar explanations, sentence patterns and vocabulary spelling than English speaking and listening. Accordingly, students tend to spend more time learning English with eyes than mouths and ears.

1.2 Literature Review

Early research focusing on large groups of bilingual immigrant children reveals that most bilinguals suffered from negative influence of bilingualism. However, Peal and Lambert (1962) first showed through their study that the bilinguals are intellectually superior to monolinguals. This finding responds to a long tradition of establishing negative effects of bilingualism on children's intellectual functioning in schools (Baker 2006). Afterwards, a large number of researches have shown evidence

that bilinguals in additive contexts are superior to their monolingual counterparts in cognitive flexibility, metalinguistic awareness, communicative sensitivity and field independence (Baker 1988). Among the findings, the relationship between cognition and degree of bilingualism is discussed extensively.

In this context, Cummins (1979, 1981) posited two conceptual arguments to explain the relationship between bilinguals' degree of bilingualism and cognition and the relationship between bilinguals' first language and second language, which have been treated as two of the guiding underpinnings of the theoretical framework in bilingual field.

1.2.1 The Threshold Hypothesis

The Threshold Hypothesis (Cummins 1979) suggests that there may be two threshold levels for bilingual children. The first threshold refers to the lower level of language proficiency whereas the second threshold refers to the higher level of language proficiency. According to Cummins, before bilingual children overcome the lower threshold when both the languages are not developed enough, a shift to the second language may lead to negative effects on cognition. When children are relatively balanced and proficient in both the languages, they reach the higher threshold and this will positively influence the potential for intellectual growth and benefit the students intellectually even if the teaching is done in the second language. At this level, children become real bilingual**.** Cummins suggests that children's second language proficiency is partly dependent on the level of proficiency already acquired in the first language.

> "…the level of L2 competence which a bilingual child attains is partially a function of the type of competence the child has developed in L1 at the time when intensive exposure to L2 begins." (Cummins 1979, p. 233)

Children's previous knowledge of literacy-related function of mother tongue can be a predictor of their future learning of these functions in second language (Cummins 1980). In other words, the more developed the first language is, the more successful it will be to develop the second language. Conversely, the less developed the first language, the less successful it will be to develop the second language.

This hypothesis could also work in reverse. When children are learning a second language, they are also developing the first language competence (Netten &

Germain 2002). In line with this, if a child with low level of mother tongue is immersed in second language when they begin school, this may result in low levels of both languages. That is, students may not experience the continued development of mother tongue nor reach the high level of second language skills. Bilinguals' level of development of mother tongue seems to be the most important thing in Cummins' framework before the children receive bilingual education.

Despite the mounting criticism on the thresholds theory by Cummins (Baker 2006), the threshold theory informed many researchers across the world. These studies provided some practical solutions to the education of children from linguistic minorities. This theory also gave a pedagogic approach for teaching in the second language. For example, the threshold hypothesis provided us with an idea that if a bilingual child has reading difficulties in one of his first or second language, this may lead to failure of reaching an adequate threshold of language proficiency. His reading problem may not result from reading ability, but from the language proficiency level acquired in schools (Garcia 2009). In addition, this hypothesis also helps explain why the early and late immersion education usually result in temporary lags in students' performance when the curriculum is taught through the second language (Baker 1988).

Despite these empirical assertions of Cummins' theory, there are educational practices in different parts of the world that remain unexplained by Cummins' theory. If Cummins' hypothesis is correct, how could Candian-French immersion programmes be so successful? Canadian-French immersion programme place the non-French-speaking children in a class that operates almost entirely in French from the initial grades. These non-French-speaking children in the early grades are not supposed to have had their first language developed well. Since neither of their two languages reached the lower threshold, according to Cummins, the children should have not benefited the advantages of bilingualism. Then, why are Canadian-French immersion programmes so successful?

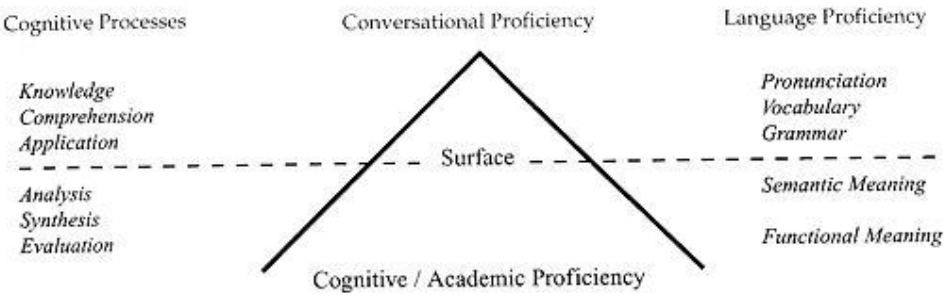
The possible reason is that during the early grades children are required only a relatively low level of listening comprehension and expressive skill. Accordingly, those children's interaction with educational environment relies less on the mediation of language than at later grades (Cummins 1979). This may give children time to develop their second language skills needed to efficiently interact with an increasingly symbolic learning environment (Cummins 1976, quoted from Cummins 1979). Here it

is noted that there should be two levels of linguistic proficiency required for early grades and later grades.

1.2.2 Conversational and academic language proficiency

Based on some findings, such as Oller (1978) and Strang (1945), Cummins (1979) argued that there are two different types of bilingual language proficiency which develop in students at different rates in either L1 or L2 in order to achieve academic success. By adapting Roger Shuy's (1976) 'iceberg' metaphor, Cummins (1984) presents the distinctions between these two elements of the bilingual language proficiency: basic interpersonal communicative skills (BICS) and cognitive academic language proficiency (CALP). The concept of cognitive academic language is widely used in the literature on bilingualism.

Figure 1-2 Iceberg representation of language proficiency



(Baker 2001, p. 170)

In Figure 2, above the surface of the sea, the conversational competence refers to BICS, such as phonological, syntactic and lexical skills. These skills are necessary to function in everyday communicative contexts (Cummins 1984). This is what Cummins calls as the lower threshold level, which a bilingual child has to reach in either of L1 or L2 to avoid the negative influence. BICS can be attained by everyone in a first language regardless of IQ or academic aptitude (Cummins 1979, 1984). These conversational contexts are usually contextually supported by meaningful interpersonal and situational cues, such as hand gestures, instant feedback and facial expression. These paralinguistic cues contribute to contextualized languages which are used for basic interpersonal communication (Baker 2006). In other words, BICS is more context embedded, and therefore these skills are cognitively undemanding

(Baker 2006; Garcia 2009). However, BICS is not enough for children to catch up the educational environment which are demanding cognitively and context reduced.

Below the surface of the sea, CALP, in contrast, requires children to manipulate or reflect on the surface features of language outside immediate interpersonal contexts. The concept of CALP is specific to "the social context of schooling" (Cummins 2008, p. 72), and it refers to students' ability to understand and express concepts orally and literately. CALP tends to context reduced and it requires higher order thinking skills, such as analysis, synthesis and evaluation, for understanding the content through the medium of a different language. Cummins refers CALP as the literacy needed for education and it can be mostly obtained in educational contexts. CALP is what Cummins refers to high level of threshold, which a bilingual child has to reach to benefit from bilingualism. Accordingly, CALP is believed to be more closely related to academic success than BICS.

Cummins (1982) further refined these two kinds of proficiency to show the relationship between BICS /CALP and the possible types of task that students may experience in class, and some types of tasks closely relate to academic achievement. Figure 3 describes the different degree of cognition and range of contextual support students may encounter in class. Students quickly achieve their communicative goals in the face-to-face situations which are supported by a wide range of situational and paralinguistic cues, such as intonation, facial expression and gestures (quadrant A). On the other hand, quadrant C communicative skills are more related to academic study, where the range of extralinguistic supports is very much reduced and requires more intellectual demands on the student.

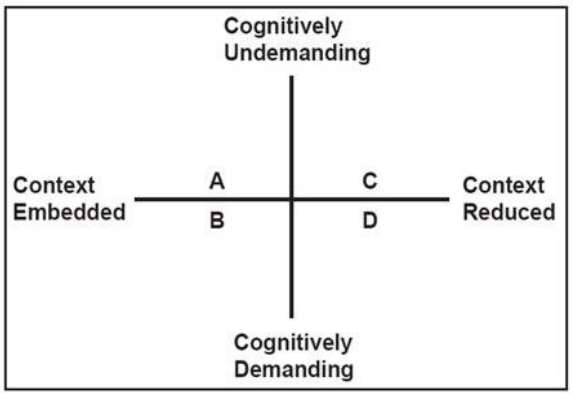
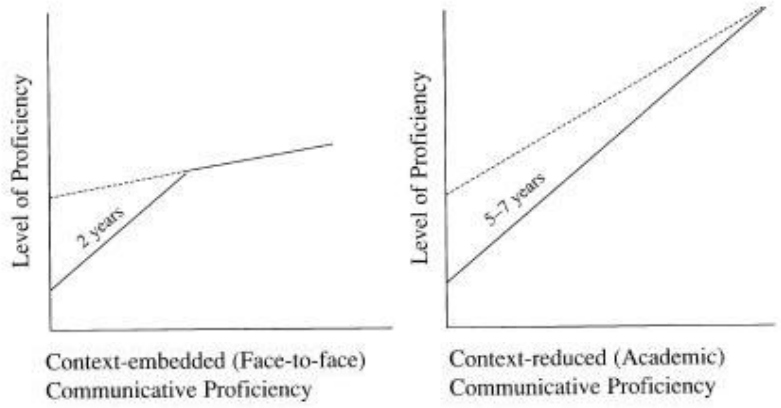


Figure 1-3 Range of contextual support and degree of cognitive involvement in communicative activities (Cummins 1982)

Additionally, Cummins also notices that native English-speaking students are not waiting for minority language students to catch up with them in many aspects of language, such as vocabulary and conceptual knowledge. Therefore, Cummins proposes the possible length of time required by native English speakers and ESL learners in terms of BICS and CALP. It needs two years of exposure to second language to reach peer-appropriate levels of conversational aspects of proficiency. Longer than the acquisition of BICS, it takes about five to seven years to acquire peer-appropriate levels in academic aspects of second language.



----Native English speakers

___ ESL learners

(Baker & Hornberger 2001, p146)

Figure 1-4 Length of time required to achieve age-appropriate levels of context-embedded and context-reduced communicative proficiency.

The implications of the distinction between BICS and CALP for bilingual education are very useful. This helps explain why bilingual children fail in an L2-only classroom when they present native-like L2 BICS. When bilingual children demonstrate good proficiency, teachers think that they are proficient in a language. In fact, children's fluency is largely false. Children's academic performance does not correlate with their oral fluency. As a result, this type of children may suffer from negative academic performance.

1.2.3 The Developmental Interdependence Hypothesis

Another hypothesis proposed by Cummins is The Developmental Interdependence Hypothesis. Cummins challenges the traditional idea of Separate Underlying Proficiency (SUP) by using iceberg as an illusion to indicate how the knowledge and ability of the two languages exit in the brain. Cummins (1981, 1984) argues that the two languages are separated only at the surface level but they are stored together and can be interactive under the surface. Under the surface, the common underlying proficiency, which determines an individual‘s performance on cognitive/academic tasks in L1 and L2, are assumed to be independent. In other words, there are academic and intellectual processes that are common to both languages. This is known as “Common Underlying Proficiency (CUP)” (1998, p.3).

Based on the idea of common underlying proficiency, it can be predicted that children are learning concepts and intellectual skills that are equally relevant to their ability to function in the majority language when they are learning through a minority language (Cummins 2001). Accordingly, L1 CALP is believed to be significantly related to L2 CALP (Cummins 1984). This transfer of the linguist skills is reviewed to account for the success of bilingual programmes which focus on children’s development of first and second language.

The transfer of linguist skills assumes that adequate and sufficient instruction in one language will make it possible to transfer the subskills to another language. As Cummins (1979) argues that “a cognitively and academically beneficial of bilingualism can be achieved only on the basis of adequately developed first language skills”(p.222), the development of students’ first language is viewed as the most important requirement when they receive bilingual programmes.

If the transfer skills from L1 to L2 really exist, it could be predicted that older L2 learners whose L1 CALP is developed much better than younger learners, are supposed to acquire cognitive/academic L2 skills more quickly than younger L2 learners. At least, no research found that younger L2 learners’ CALP is developed more rapidly than older L2 learners (Cummins 1984).

In addition, the view of transfer of skills across linguistics refutes the assumption that the degree of exposure to a language directly related to achievement in that language. The developmental independence hypothesis challenges the validity of “maximum exposure” in second language learning. Cummins (1983, 1989) found

that the large amount of instruction in English the language minority students receive lead to a negative result in their English academic achievement. There is no research data showing any positive relationship between the amount of a language used as the medium of instruction in a programme and student outcomes (Cummins 1999; Auerbach 1993).

Based on this linguistic independence and the threshold hypothesis, it can be noted that first language plays a significant role in the success of bilingual education. Given the importance of first language, the following section will discuss how the use of first language helps children benefit from bilingual programmes.

1.2.4 First Language in Bilingual Programmes

Monolingual principle has long been one important tenet in second or foreign language classroom. It is believed that target language should be the only means of communication in second or foreign language classroom and this will bring the most advantages of target language learning. For example, more than 20 years ago, Phillipson (1992) suggested five key tenets of ESL / EFL. One of these five key tenets is “the more English is taught, the better the results” and this had a great impact on English teaching all over the world. Auerbach (1993) also conducted a survey asking if English language learners are allowed to use their first language in English as a second language classroom. Only 20% of the respondents said “yes”. 30% answered “no”. Half of the respondents said “sometimes”. In line with Phillipson’s tenet mentioned above, the result of the survey showed the view framed in pedagogical terms: the more the learners are exposed to English, the more quickly they will learn. In other words, the use of students’ first language should be relatively less than the use of English. Differently from this view, some researchers emphasize the place of mother tongue in second language learning.

Krashen (1981) and Long (1996) propose comprehensible input as one crucial element of successful language teaching and learning. According to Krashen, “comprehensible input” refers to the understandable message by the learner. In second language learning, to the learner, his mother tongue must be the most understandable language. Based on this, the language of instruction in L2 learning class should be learners’ mother tongue and it is supposed that mother tongue as the medium of instruction in class will result in more comprehensible input than L2.

Supporting Krashen’s input hypothesis, Genesee (1987) listed eight simple

strategies to make input comprehensible. One of them is the use of native language in second language classroom. Genesee argued that there is no reason for bilingual teachers not to use the students' first language to help clarify messages. Additionally, Genesee suggested that the use of first language encourage communication and facilitate negotiation f meaning. The use of first language also helps students have a sense of well-being and belongingness.

Cummins proposed that there is an interaction between language of instruction and the level of language proficiency a child has acquired before he begins school. Before school, children have not formally received literate education. If children receive reading task in a second language at the very beginning of schooling, they may have more difficulties in the class because they can not relate this second language to their spoken mother tongue (Carlson & Pollard-Durodola, 2007). This suggests that the first language of instruction at the initial period of schooling is crucial in students' performance in literacy.

Marsh, Hau and Kong (2002) conducted a 6-year longitudinal investigation in 56 high schools of Hong Kong. They examined the effects of language of instruction on academic self-concept and on the reciprocal effects of academic self-concept and achievement. In Hong Kong, mother tongue is Chinese, but English is used everywhere. The schools can be classified into three language-of-instruction types: English, Chinese and mix of English and Chinese. Therefore, the participants of 7,802 students were chosen from the above schools. Compared with students who were taught in Chinese, this research found that there were systematic, negative effects on academic self-concept and academic achievement among students receiving English as the medium of instruction, especially during the first 3 years of high school. However, the negative effects appeared to be negligible in the final year. Marsh, Hau and Kong further explained that the possible reason for this was students had adjusted to English instruction, so they no longer experienced the negative influence of English as the language of instruction.

There is one investigation on French-speaking Canadian students attending the French-medium schools located in English spoken communities. This investigation found that these students achieved the same level of English proficiency as did comparable French-speaking students receiving English as the medium of instruction in the same community (Hebert, 1976, quoted from Genesee, 1987). This also testifies that more exposure to English in bilingual programmes does not necessarily result in

higher levels of English language proficiency.

According to Lindholm (1990), the success of bilingual immersion programmes is based on the premise that a second language is best acquired by the learner when their first language is firmly established. This echoes with Cummins' idea on the threshold hypothesis and underlying proficiency: the necessary linguistic foundation of first language facilitates, the later acquisition of second language and the further development of full proficiency in both languages. In addition, Children will fear less and will be more willing to participate in classroom activities, which contributes to their development of reasoning, scientific and logical thinking, abstract and theoretical thinking if the class language is more comprehensive by them. (Agnihotri, 2007; Mohanty 2009; Panda, 2008; Mohanty and Panda 209). The use of children's first language seems to create a more friendly classroom atmosphere for children and help them develop cognitive academic skills.

1.2.6 Language, Knowledge and Subjectivity

Language is the major facilitator of social learning and development and is also a marker of identity (Goodnow 1987；Vygotsky 1999). Language is not an isolated construct but an extension of one's culture and subjectivity (Vygotsky 1999; Miller 1983). When people learn a language, they also construct their subjectivity and cultural identity. Identity is an on-going self-construal process that has both affective and cognitive sides. Acceptance and use of one's language creates an intersubjective space that is inclusive of his self and culture. The affective engagement of the children in the classroom transactional processes and learning will be significantly higher when her language and her funds of knowledge are used as legitimate classroom resources. They will be culturally more situated and therefore will accept diversity without rejecting themselves or others. Studies reveal a direct relationship between use of one's mother tongue in the early years of schooling and development of fearlessness and better learning among children (Panda, 2010, 2012; Manocha and Panda, In Press).

The negotiation of cultural identity in so called English medium schools seems to be an inevitable process in the context of English as a foreign language (EFL). The strategies adopted by EFL learners are therefore categorized as preservation, assimilation, acculturation (Schumann 1978). In preservation, children adopt values of

their own language and culture and completely reject values of the target language. This is similar to “separation strategy” defined by Berry (1997). In assimilation, the situation is totally reverse to preservation. Children’s first language is replaced with the second one. This is associated with “subtractive bilingualism”, which is defined by Lambert (1977) and Cummins (1979). Subtractive bilingualism often happens in the children of immigrant families (Wong Fillmore 1991). In acculturation, children maintain their original culture while participating in the target culture as well. This is in line with what Berry called as “integration strategy”(1997). Schumann maintains that "…the degree to which the learner acculturates to the target language group will control the degree to which he acquires the target language" (1978 p.34). Acculturation is associated with “additive bilingual”, which is the goal of English learning in the majority of Asian countries, such as Taiwan, Korea, and Japan (Chuang 2004).

However, Schumann’s three strategies are not satisfying to some extent. Some researchers even propose that the language learners’ cultural strategies are not only “either/or”. Instead, learner’s cultural strategies can be matter of coexistence, hybridization, and blending (Chen 2006). Kramsch (1993) maintains that learners need a “third place”, a privileged and questioning location, to negotiate their own and other cultures when they learn different languages. It is called “third culture” (Kramsch, 1993) or “hybrid culture” (Bhabha 1994; Pieterse 1994). These strategies provide a framework for understanding how learners’ possible attitudes and reactions towards the values of their own language and other different languages get formed and negotiated. These new paradigms question the hegemonic position of the target languages and argue in favor of a context where all languages are placed equally in the hierarchy of languages so that all children and teacher speak from authority (Panda 2012; Panda and Mohanty, In press).

In Taiwan, English is a foreign language and English proficiency is viewed as an asset and an indicator of social and economic power. In Taiwan, students enrolling Mandarin Chinese – English bilingual programmes are supposed to become “additive bilinguals”. Additive bilingual approaches aim to “foster acquisition of a second language while maintaining and continuing to develop the first language (Ernst-Slavit 1997, p. 25) ” For the students in Taiwan, they are expected to learn English while they maintain their Mandarin Chinese. However, what are bilingual school children’s perceptions of Mandarin Chinese and English, and of local culture and western

culture in the context of overemphasis that the Taiwanese society places on English? Would the undue emphasis on English and using it as a target language cause loss of one's cultural identity? Will this disenfranchise Taiwanese further and distance itself from the Taiwanese society by creating two tiers of citizens, one that speaks English the way Westerners speak English and the other that doesn't speak English well. By targeting a particular foreign language and therefore an outside culture over the indigenous language and culture in the schools, an indigenous community may unknowingly dismiss its own people's culture, language and funds of knowledge (Panda and Mohanty 2009). Since, English is necessary for doing economically well in the new global world market, the Taiwanese society can't ignore the need to acquire this linguistic capital but at the same time it needs a paradigm where both English and the mother tongue of the Taiwanese children are given equal place and opportunities to grow (Agnihotri 2007, Panda 2012). So, what a modern democratic society needs is a good bilingual/multilingual education programme where languages operate in less hierarchical manner. All children from different linguistic background are equally accepted in the classroom and get an opportunity to speak and communicate in their language and use their everyday knowledge and practices as classroom resources (Agnihotri 2007; Panda 2012).

1.3 Rationale for the Study

In Taiwan, Mandarin Chinese is the mainstream language whereas English plays the role as a foreign language. Most Taiwanese people are bilingual with their vernacular and the official language, Mandarin Chinese. However, all vernaculars used in daily life are only in oral forms, not written forms. According to Cummins, high conversational skills do not equal to the same level of academic language skills, which is crucial to academic achievement. Accordingly, notwithstanding the multilingual environment, Taiwan students' Mandarin Chinese proficiency is the possible indicator of their level of conceptual understanding, academic success and English proficiency.

In spite of the prevalence of preschool English learning, it is believed that the majority children's Mandarin Chinese is very much better than English at the time when they receive formal elementary education. It should be also noted that early elementary graders' Mandarin Chinese is still under development.

Most of the government-run elementary schools provide students with two

forty-minutes English classes every week and the majority of English classes are taught through Mandarin Chinese. However, students in private bilingual schools are taught in English fifty percent of the syllabus and another fifty percent in Chinese Mandarin. The objective behind such a programme seems to be drawing its rationale partly from assimilationsist model and partly from Cummin's linguistic interdependence theory.

According to the development and proficiency of first and second language, and the relationship between language, cognition and academic growth discussed previously, Taiwan's students, whose Mandarin Chinese is under development and who are partly or holy immersed in English programmes, may have relatively poorer performance in both languages and non-language subject like mathematics compared to their government-run elementary school counterparts. It is assumed that, Taiwan school students may become "semilingual" in the earlier context. However, when Taiwan school students' both languages reach a higher threshold level of development, they enjoy the positive impacts from bilingual skills. It is important to study the social, personal and academic consequences of "semilingualism".

It is estimated that the tuition fee required for private bilingual schools is forty-three to sixty-two times higher than government-run elementary schools (Lin and Yang 2003). Is it a worthy investment for children? How good do bilingual schools help children achieve their Mandarin Chinese, English and academic success and how far these goals align with the larger goals of the Taiwan society?

In Taiwan, the issues for English teaching and learning, often linked with ideas of second language acquisition, interculture, teachers' training, textbook and motivation, are raised constantly. However, very few research focus on bilingual education in Taiwan. Accordingly, the principal purpose of this study tries to investigate the effects of first language proficiency on the second language and academic achievement in content subjects, mathematics, of students bilingually educated in Taiwan. Understanding students' ongoing development in mother tongue, second language, and nonlanguage contents, and the correlations of the above-mentioned subjects will be useful in helping determine how best to meet the needs of students and further teach students effectively. In addition, there has been no data regarding how bilingual school children participate in the classroom activities, so accordingly this will be also investigated. Accordingly, this study will fill a gap in the literature and to evaluate hypotheses derived from theory that have yet to be fully

evaluated empirically.

1.4 Theoretical Framework

This study has used two hypotheses as the framework:

1. The Threshold Hypothesis

The hypothesis of threshold theory suggests that there are two thresholds for bilingual children. When children can function effectively in one language, they reach the lower threshold. At this level, there are likely to be no negative or positive cognitive effect. When the children are relatively balanced and proficient in both languages, they reach the higher threshold. The higher threshold is a level required for bilingual children to experience the possible positive effects of bilingualism. At this level, bilingual children are supposed to benefit from the positive effects of acquired new cognitive structures than monolinguals (Cummins 1979).

Cummins (2008) believes that there are two components of the construct of language proficiency: conversational fluency and academic language proficiency. Cummins terms conversational fluency as basic interpersonal communicative skills (BICS) and academic language proficiency as cognitive academic language proficiency (CALP). The concept of CALP is specific to "the social context of schooling (Cummins 2008, p. 72)" and it refers to students' ability to understand and express concepts orally and literately. CALP is suggested to be central to scholastic success (Cummins 1980). In line with this, to be a disadvantage or an advantage related to academic achievement seems to depend on the high levels of competence attained in both languages, including literacy and formal languages skills.

2. The Developmental Interdependence Hypothesis

This hypothesis states that a bilingual's second language proficiency is partly dependent on the level of proficiency already acquired in the first language, and the skills developed in the first language will transfer to the second language (Cummins 1981, 1998). As Cummins suggests, "previous learning of literacy-related functions of language (in L1) will predict future learning of these functions (in L2)" (Cummins 1980 p.178). In other words, the more developed the first language, the more successful it will be to develop the second language. Conversely, the less developed

the first language, the less successful it will be to develop the second language.

Based on this linguistic independence and the threshold hypothesis, it can be noted that the transfer of linguistic skills occurs only after children's second language has been developed to certain level of proficiency (Wakabayashi 2002). In addition, if a child with low level of mother tongue is immersed in second language when they begin school, this may result in low levels of both languages. That is, students may not experience the continued development of mother tongue nor reach the high level of second language skills, which would result to "semilingualism." As Cummins argues that "a cognitively and academically beneficial bilingualism can be achieved only on the basis of adequately developed first language skills" (Cummins 1979, p.222), the development of students' first language is viewed as the most important requirement before they receive bilingual education.

1.5 Research Questions

1. Do bilingual school students outperform their regular school counterparts in the performance in Mandarin Chinese, English and mathematics in Taiwan?
2. Do bilingual elementary school and regular elementary school children differ significantly in the relationship between Mandarin Chinese proficiency and English proficiency?
3. Do bilingual elementary school and regular elementary school children vary significantly in the relationship between Mandarin Chinese proficiency and Mathematics achievements?
4. Do bilingual elementary school student reach similar or different achievement in both the L1-medium and L2-medium math tests?
5. Do children participate and more take initiatives, and experience less fear in the classrooms where teaching is carried out in Mandarin Chinese?

Broad objective of the Study:

This research has been guided by the following broad objective:

What is the relationship between mother tongue and the target language, and how does this influence the educational development among Taiwan school children?

Specific objectives are as the following:

- To study if mother tongue proficiency (Mandarin Chinese) is an indicator of the good target language (English) learning in Taiwan.

- To examine if mother tongue proficiency (Mandarin Chinese) is an indicator of the achievement in non-language subjects like mathematics in Taiwan.
- To compare the participation, initiatives and fearlessness among students in mother tongue-medium and target language-medium classes in Taiwan.
- To examine if the medium of instruction affect the mathematics learning in elementary schools in Taiwan.

To answer these questions, the comparisons have been drawn between the performance of Mandarin Chinese-English bilingual children in grades 3 and 6 with that of students in grade 3 and 6 from Mandarin Chinese medium regular school in Taiwan. These four groups have been given grade-appropriate tests in Mandarin Chinese, English and mathematics. Bilingual school students have English-medium math class, so they are given an extra mathematics test in English version. Classroom observations have been conducted to capture data on literacy practices and classroom discourse for understanding better the context of literacy development in the search settings.

1.6 Hypothesis

Given the previous review of literature on the findings that bilingual children's development of literacy in mother tongue help them achieve higher level of proficiency in a second language and better academic success, this study aims at finding out the performance of students from private bilingual schools and regular schools of Taiwan in Mandarin Chinese (MT), English, Science and Mathematics subjects, and the correlations among these four subjects. This research will test the following hypotheses:

1. There will be a positive relation between Mandarin Chinese proficiency (L1) and English proficiency (L2).

2. The students from the regular school will perform significantly better than those from the bilingual school in Mandarin Chinese proficiency (L1).

3. The students from the bilingual school will perform better than those from the regular school in English proficiency (L2).

4. There will be a significant positive relationship between Mandarin Chinese proficiency (L1) and Mathematics.

5. The bilingual school children will perform better in mathematics than their regular school counterparts.

6. The bilingual school students perform lower mathematics achievement in English version than in Mandarin Chinese one.

7. The regular and bilingual school children differ significantly in classroom participation, initiative taking and fearlessness

Chapter 2 Methodology

This chapter outlines the formal research, providing information on how the subjects were chosen and a description of the two sites where the study took place. It presents the research tools used and the results of the pilot study conducted to assess the efficacy of these tools. It also discusses the tools of data analysis.

2.1 Research Design

The aim of this study is to investigate the effects of first language proficiency on second-language acquisition and academic achievement in content subjects, particularly mathematics, of students bilingually educated in Taiwan. Comparisons were drawn between the performance of children in grades three and six studying at a L1-L2 bilingual school with those of students studying in grades three and six in a regular private school in Taiwan. Since L2 instruction begins in the first grade in both the schools, third graders were chosen for this study because both sets of students have had two years of exposure to English language education. The sixth grade was chosen because it is the final year of elementary school. Grades three and six, accordingly, were the target groups of this research.

These four groups had been given grade-appropriate tests in L1, L2 and mathematics (L1 version). In addition, bilingual school students were given the same mathematics test in the L2. The mathematical content corresponded exactly to the L1 version. To minimize the chance that students remembered the answers, the English L2 version was given to bilingual school students twenty days after they had taken the same mathematics test in their L1 Mandarin Chinese. All tests were given at the teachers' convenience as part of normal school activities. Participants were given the tests in the presence of their homeroom teachers.

2.2 Measurement

Test performance provides an objective indicator of how well the students are doing in the two types of schools. Accordingly, curriculum-based tests in the L1, L2,

and mathematics (both L1 and L2 versions) were developed for this study. All tests were designed with the help of teachers currently employed at the bilingual school and the regular school to meet the grade-prescribed syllabus of each school. The topics and the task types showed a high degree of similarity with activities previously used in the classes. Measuring instruments in Mandarin Chinese, English, and mathematics included tasks that were simple to score and assess. The score for each test was equal to the number of correct answers. The maximum score for Mandarin Chinese, English and mathematics was forty, forty, and thirty points respectively. The details for each subject are described in the following sections.

Mandarin Chinese

This task aimed to measure students' learning achievement in Mandarin Chinese. This task was designed with three teachers, who had twelve, fifteen, and sixteen years of teaching experience respectively. Students were required to finish forty questions divided into five different tasks: Written Pronunciation, Vocabulary, Syntax, Sentence Construction, and Reading. In the Written Pronunciation task, students needed to write down the correct pronunciation symbols of the underlined word presented in one sentence. In the Vocabulary task, students needed to write down the missing word in a sentence. In the Syntax task, students needed to recognize grammatically correct sentences. In the Sentence Construction task, students needed to write down a complete sentence using the phrases provided. In the Reading task, students needed to choose the correct answer after having read one paragraph. The total score was forty points. One point was given for each item.

English

This task aimed to measure students' learning achievement in English. This task was designed with the help of two teachers, one local teacher with nine years of teaching experience and one English-speaking teacher with three years of teaching experience. The English test included Vocabulary, Grammar, Dialogue, Reading Comprehension and Sentence Construction using phrases provided. The total score was forty points. One point was given to each item.

Mathematics

L1 and L2 versions of the mathematics tests were prepared. The content of the two versions was designed to match. The L1 version was designed with help from two teachers, who had five and seven-and-a-half years of teaching experience respectively.

The inappropriate use of a language in the math test may not offer an accurate picture of students' mathematical knowledge (Cuevas 1984). Accordingly, L2 version of the mathematics test was translated by a native English translator working at a university with over six years experience translating Chinese to English. Later, an English-speaking Chinese teacher who teaches mathematics to elementary students modified some words to be more readily understandable based on the textbooks. The words used in mathematics tests in both languages were considered very carefully. The total score was thirty points. One point was given to each item.

2.3 Pilot Study

To examine and ensure the validity and reliability of the research and proposed measurement criteria, a pilot study was first carried out. The pilot study was conducted in October of 2012 after the tests were ready and the necessary permissions obtained.

The pilot was carried out with a group of 145 students from two elementary schools in Hsinchu, Taiwan (Table 2.1). There were seventy-five third graders and seventy sixth graders. These students were randomly selected and all reported that they had grown up in Taiwan and use Mandarin Chinese as one of their languages at home. Besides Mandarin Chinese, Hakka and Taiwanese were also sometimes used in the home. Participants had one forty to forty-five minute class session for the Mandarin Chinese and English tests, and one fifty to fifty-five minute class session for the mathematics test. However, due to the difficulty in finding students who were taught mathematics classes in English in Taiwan, the English version of the mathematics test was not included in the pilot study. The results of the pilot study are shown in Table 2.2 and 2.3.

Table 2-1 Numbers of Participants in the Pilot Study

	Third Graders		Sixth Graders	
School 1	18 boys	15 girls	16 boys	17 girls
School 2	22 boys	20 girls	20 boys	17 girls
Total	40 boys	35 girls	36 boys	34 girls
	75 students		70 students	
	145 students			

Table 2-2 Results of the Pilot Study: Third Graders

	P value	**Reliability**	**Item Modified**
Mandarin Chinese	0.48<P<0.62	0.58<D<0.82	
English	0.44<p<0.56	0.56<D<0.64	19, 23, 30, 31, 36
Mathematics	0.47<P<0.53	0.51<D<0.77	

Table 2-3 Results of the Pilot Study: Sixth Graders

	P value	**Reliability**	**Item Modified**
Mandarin Chinese	0.44<P<0.61	0.62<D<0.72	
English	0.46<p<0.63	0.58<D<0.65	26
Mathematics	0.48<P<0.58	0.53<D<0.71	

2.4 Formal Study

Based on the results of the pilot, some items were modified in the final study. For the English test for third graders, items 19 and 23 in the Dialogue Task as well as items 30, 31, and 36 in the Reading Comprehension were modified. For the English test for sixth graders, item 26 in the Dialogue Task was modified.

Finalized tests were administered to students in classroom groups from early December 2012 to mid-January 2013. Participants had one forty to forty-five minute class session for the Mandarin Chinese and English tests and one fifty to fifty-five minute class session for the mathematics test. Students in the bilingual school took the English version of the mathematics test twenty days after they had finished the L1 version of the mathematics test.

2.4.1 Participants

In order to reduce the possible variables and ensure the trustworthiness of the investigation, there were two limitations on participants. First, participants' home language must be Mandarin Chinese; second, participants must never have lived abroad and acquired English as a first language. After the investigation, there were four students from the bilingual school, one from the third grade and three from the sixth grade, who had lived in an English-speaking country prior to this research. The results for these four students were excluded.

The remaining students, 163 children from the bilingual school and 158 children from the regular school, all reported that their parents are Mandarin Chinese native speakers, so these students had received much more exposure to Mandarin Chinese as their home language. Twenty-three children from the bilingual school and thirty-eight children from the regular school had received roughly equivalent amounts of exposure to Taiwanese and Hakka (local languages) when talking to their grandparents. None of them had received significant exposure to other languages. All of the children had been receiving continuous exposure to Mandarin Chinese and English starting from the first grade of elementary school. All of the students were born in Taiwan and used Mandarin Chinese as their L1. In other words, these students do not have linguistically and culturally diverse backgrounds, so in total 321 students qualified to take part in this study.

The 321 qualified students included: 158 students from the regular school and 163 from bilingual school. They were third and sixth graders, aged nine and twelve years. However, a substantial number of students missed one or more tests due to absence on test days, so only 309 students completed all tests. Final data was collected from these 309 students (Table 2.4). There were 160 students from the bilingual school (grade three: 82 and grade six: 78), and 149 students from regular school (grade three: 76 and grade six: 73).

The genders were equally represented across age groups and school types, as can be seen from tables 2.5 and 2.6. Out of of the 309 students who participated in the study, 25.32 % were grade three boys, 22.78% were grade three girls in the regular school, 27.85% were boys and 24.05% were girls in the bilingual school, 26.49 % were grade 6 boys and 25.17% were grade 6 girls in the regular school, 21.19% were grade 6 boys and 27.15% were grade 6 girls in the bilingual school.

Table 2-4 Numbers of Participants from the Two Schools

	Third Grade	Sixth Grade
Bilingual School	82	78
Regular School	76	73
Total	158	151

Table 2-5 Gender Distribution of Third Grade Participants

	Gender	Number	%
Regular School	Male	40	25.32
	Female	36	22.78
Bilingual School	Male	44	27.85
	Female	38	24.05
		158 students	100%

Table 2-6 Gender Distribution of Sixth Grade Participants

	Gender	Number	%
Regular School	Male	32	21.19
	Female	41	27.15
Bilingual School	Male	40	26.49
	Female	38	25.17
		151 students	100%

2.4.2 Site of Formal Study

In Taiwan, all bilingual schools, so-called “noble schools”, are private schools that charge much higher tuition fees and are equipped with better facilities. This means in practice that students enrolling in bilingual schools generally come from higher-income families. Considerable studies suggest that socio-economic status is strongly related to children’s academic achievement (Ramey and Ramey, 1994). In order to ensure all participants were generally comparable with respect to

socio-economic background, and to minimize differences and variables often noted between urban and rural schools (Rohlen 1983), the comparison group was selected from the same region. It is estimated that the tuition for bilingual schools is about forty-three to sixty-two times higher than government-run elementary schools (Lin and Yang 2003). Accordingly, counterparts for the bilingual students were chosen from a regular private school from the same city that caters to the children from the middle class. The regular private schools charge much higher tuition fees than regular government schools in Taiwan and at par with the bilingual private school chosen for this study.

The two schools in the northern part of Taiwan were chosen to be the focus of this research because of their equally good reputations. As pointed out previously, these two private schools charge much higher tuition than regular government schools. Students of the bilingual school and the private school receive their formal education in a social environment very different to that found within the regular government school system. The students from these two types of school are not exposed to such a diverse student demography as their counterparts studying in government schools. For example, none of the students in these two-type schools have special needs. Besides, a requirement was made by both schools that they did not want to be identified in this research, thus "bilingual school" and "regular school" were used to refer to these two kinds of schools. Both schools provide modern technology to facilitate the process of teaching and learning. The following section will describe the two schools in detail.

Bilingual school

Bilingual school was established based on evidence from successful bilingual programmes in western countries. Bilingual school educates children from seven years old (first grade) to twelve years old (sixth grade). All teachers make lesson plans based on a predesignated syllabus. Students study in mixed-sex classrooms from grades one to six. There are about twenty-five to thirty students in each class with one homeroom teacher.

All classes run from Monday to Friday and last for forty minutes, except the first class, which lasts for thirty minutes starting at 8:00 and finishing at 8:30. There are nine classes each day. In general, students are instructed mostly in English in the morning and in Mandarin Chinese in the afternoon. The separation of two languages helps

> "…the teacher avoids, it is argued, cross-contamination, thus making it easier for the child to acquire a new linguistic system as he/she internalizes a given lesson. (Jacobson & Faltis,1990. p. 4)"

Students in grades one and two have twenty classes in English and twenty classes in Mandarin Chinese per week whilst students in grades three to six have sixteen classes in English and twenty-four classes in Mandarin Chinese a week. Syllabus design for bilingual programmes in Western countries tends to include content materials for half of the school day in the L1 and half of the school day in the L2 (Swain, 2000). Bilingual school follows the basic curriculum design of bilingual programmes in Western countries. Bilingual school provides for content area instruction and language instruction in both languages and aims to develop students' high levels of proficiency in the first language and the second language. Students from grade one receive instruction in both the L1 and the L2. Instructional time for grades one and two is approximately 50% in the L1 and 50% in the L2. As students move up the grades, the amount of instruction they receive in their L1 gradually increases and this shift is accompanied by a decrease in the amount of instruction received in their L2. This can be referred to partial immersion in literature. According to Baker (2006), there are early immersion (aged 5 or 6), middle immersion (aged 9 or 10) and late immersion (aged 11 and 14) depending on the age when students begin L2 learning. The schools under this study offer early immersion because students learn English starting from grade one (7 years old).

In order to develop student proficiency in the two target languages, Mandarin Chinese and English, bilingual school follows the compulsory curriculum required by the Ministry of Education of Taiwan along with courses required in America. Accordingly, there are two versions of textbooks for mathematics. Although there are two versions, one in Mandarin Chinese from Taiwan and the other in English from America, students are taught the same content covered in both versions, with the Mandarin Chinese version taught first and the English version later. The aim is to prepare students to study in their L1 at local junior high schools later or to study abroad through English-medium instruction after elementary school. It is believed that students will no longer face difficulties in receiving secondary education in English-speaking countries.

Table 2-7 Total Number of Mandarin Chinese Classes, L1 Mathematics Classes, and L2 Mathematics Classes per Week per Grade for Bilingual School

	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Mandarin Chinese	5	5	5	5	6	6
L1 Mathematics	3	3	4	4	5	5
L2 Mathematics	4	4	4	4	4	4

Bilingual school has fifteen English-speaking foreign teachers (English is used as one of the languages they communicate with others) and twenty-seven local teachers (whose L1 is Mandarin Chinese). Mandarin-Chinese-speaking local teachers are in charge of subjects taught in Mandarin Chinese and English-speaking foreign teachers are responsible for subjects instructed in English. English-speaking teachers are from America, Canada, the Philippines and Jamaica. No details were given regarding the qualifications and experience of the foreign teachers. No information was provided on additional languages spoken as either an L1 or L2 by foreign teachers other than they do not know or know very limited Mandarin Chinese. As far as the languages mastered by the local teachers, the twenty-seven teachers are Mandarin Chinese native speakers and know English well, but they only use Mandarin Chinese in class. The range of teaching experience for local teachers is quite wide with three years for the most novice teacher to up to eleven years for the most experienced. This school offers a clear separation between the language used by English-speaking foreign teachers and the language used by local teachers. Table 2-8 presents the details for two groups of teachers. The above information was provided by the chief administrator of bilingual school.

Table 2-8 Details for Two Groups of Teachers at Bilingual School

	Local teachers	**English speaking teachers**
Number	27	15
Country	Taiwan	America Canada The Philippines Jamaica
Mandarin Chinese	Native	Very limited or unknown
English	High level	Fluent

Resource: the director in bilingual school

Regular School

Similar to the bilingual school discussed previously, the regular school educates children from seven years onward (first grade) to twelve years (sixth grade). Children come from the local neighbourhood, which can be inferred to be mostly middle class because of the high tuition fees.

From Monday to Friday, the first class starts at 8:40 and the last class ends at 15:50. There are seven classes each day and each class lasts forty minutes. Compared to the bilingual school, regular school has ten fewer classes each week (bilingual school : forty-five classes, regular school: thirty-five classes).

Different from bilingual school, where English language is used as a language of instruction for part of the subjects, the comparison groups from regular school receive instruction in Mandarin Chinese for all subjects, including in English language learning. All teachers in regular school are local Taiwanese teachers, including English teachers. This school offers formal English courses from grade one as bilingual school does. Students have between two and five forty-minute English classes per week, of which Mandarin Chinese is mostly used as the language of instruction. Apart from the different amount of school time learning English in the English language class, the most significant difference is that regular school students are not taught other subjects in English. Table 2-9 presents the number of classes for Mandarin Chinese, English and mathematics per week from grades one to six.

TTable 2-9 Number of classes for Mandarin Chinese, English, and Mathematics per Week for regular school

	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Mandarin Chinese	5	5	5	5	6	6
English	4	4	5	5	6	6
Mathematics	4	4	5	5	6	6

Four female teachers, out of total thirty-two teachers, run English class. These four teachers were aged 28, 32, 33 and 35 at the time of the study. They all learnt English as a foreign language in the same way their students do. Three of the teachers hold Bachelors Degrees from Taiwanese universities and one has a Masters Degree from an American university. The teaching experience for these four teachers ranged from three years to six years.

Class sizes in regular school (around forty to forty-five students / class) are much larger than bilingual school (twenty-five to thirty students / class). Classrooms in bilingual school are equipped with new facilities such as touch screen boards linked to computers. In general, these two schools were found to be adequately equipped and staffed. Homeroom teachers are seated in the front (regular school) or the back (bilingual school) of the classroom and are responsible for students' behavior while teachers give lessons.

2.5 Classroom Observation

Classroom observation is the best approach to understand how teachers teach and how teachers and students interact in the classroom (Good & Brophy, 2000). With this method, a better understanding was gained of the interactions and activities taking place in classes at each of the two schools. This understanding may help to explain the varied outcomes of English and mathematics learning of the bilingual school and the regular private school students that will be reported in part II of Chapter 3.

Part II of Chapter 3 begins by describing the classrooms in terms of its environment, teaching styles, teacher-student and student-student interactions etc. It also investigated how students behave differently in the classes conducted by the native English speaking teachers and local teachers in order to further understand how the difference in behaviors influences academic performance. The aim is to present an exhaustive picture of classrooms dynamics.

The classroom observations were made from February to May in the second term of the 2012 school year. The researcher arranged to sit at the back of the classroom and was allowed to move horizontally at the back of the classrooms. With the teachers' consent, audio recordings of the classes were permitted, but not video recording. The researcher took notes and photos where ever possible.

2.6 Tools for Data Analysis

Mixed-design ANOVA is used as the method of analysis. The school group was the between-subject variable and the grades were the within-subject variable. This resulted in a two (school group: regular private school vs. bilingual school) by two (grades: three and six) mixed-design ANOVA. Moreover, three effects are

compared: 1. Group effects (regular school vs. bilingual school, across two grades), 2. Age effects (grade three vs. six across regular private school and bilingual school), 3. Interaction between group and age effects. Post-hoc analyses are conducted where main effects or interaction effects are found to be significant. In addition, the Pearson correlation of coefficient is applied to see the strength of linear dependence among the above-mentioned subjects. The observation data are analysed using content analysis technique.

2.7 Procedure

The procedure of the study comprised of the following steps:

1. The researcher contacted sixteen bilingual schools about conducting research on their campus in June 2011, but only one bilingual school responded positively. In order to match the participants on the socio-economic background and on urban and rural divides (Rohlen 1983), the comparison group was selected from the privately run regular schools in the same region catering to the children from the middle class.
2. The researcher developed the tests with the help of the experienced in-service teachers to meet the grade-prescribed syllabus mandated by the Ministry of Education of Taiwan.
3. The researcher contacted six elementary schools for a pilot study, and two schools responded positively. The pilot study was conducted in October 2012. The results of the pilot study led to the modification of some test questions.
4. The formal study was administered to students in classroom groups from early December 2012 to mid-January 2013.
5. The classroom observations were made from February to May 2013.
6. After collecting the data, the researcher analyzed it, explained the statistical results, and made conclusions and suggestions based on the data obtained from the study.

Chapter 3 Data Analysis

3.1 QUANTITATIVE DATA ANALYSIS

1. Mandarin Chinese

Table 3-1 presented below shows the mean, standard deviation and the coefficient of variation of scores in Mandarin Chinese. The average score for 3rd grade, 6th grade as well as combined figure is indicative of the performance in Mandarin Chinese is better in regular school when compared with bilingual school. The coefficient of variation, which is a measure of consistency, can be used to establish the consistency in performance among regular schools and bilingual school. Interpretational a low coefficient of variation indicates a better consistency and vice versa. Here, the regular school 3rd grade has a coefficient of variation of 33.9 percent when compared with its counterpart in bilingual school (37 percent). In 6th grade the coefficient of variation for regular school is 40 percent as against 44 percent for bilingual. The combined coefficient of variation for regular school is 37.1, whereas it is 40.5 percent for bilingual school. In all these cases the consistency of performance in Mandarin Chinese is better in regular school when compared to bilingual school. Over all from the mean as well as coefficient of variation, it is clear that the performance of Mandarin Chinese in regular school is better than in bilingual school.

Table 3-1 Mean, Standard Deviation and Coefficient of Variation: Mandarin Chinese

	Mandarin Chinese		
	Mean	**SD**	**CV**
Regular School 3rd grade	19.1	6.5	33.9
Regular School 6th grade	20.0	8.0	40.0
Regular School	**19.5**	**7.3**	**37.1**
Bilingual School 3rd grade	16.8	6.2	37.0
Bilingual School 6th grade	17.0	7.5	44.0
Bilingual School	**16.9**	**6.8**	**40.5**

2. **English**

The performance in English is moderately better in bilingual school than in regular school in terms of average score both grade-wise as well as combined. The 3rd grade regular school has an average score of 18.5 while that of a bilingual school is 19.8. Similarly the 6th grade average for regular school is 19.3 and that of bilingual school is 19.9. The coefficient of variation suggests there is a sharp consistency in bilingual school. The coefficient of variation for bilingual school is 31.6 percent as against 37.1 percent for regular school. This greater consistency for bilingual school is mainly attributed to the performance of 6th grade bilingual school. The coefficient of variation for bilingual school in this category is 28.9 percent as against 38.9 percent for regular school. Over all one can conclude that the performance of English is better in bilingual school as compared to regular school.

Table 3-2 Mean, Standard Deviation and Coefficient of Variation: English

	English		
	Mean	**SD**	**CV**
Regular School 3rd grade	18.5	6.5	35.3
Regular School 6th grade	19.3	7.5	38.9
Regular School	**18.9**	**7.0**	**37.1**
Bilingual School 3rd grade	19.8	6.7	34.1
Bilingual School 6th grade	19.9	5.8	28.9
Bilingual School	**19.8**	**6.3**	**31.6**

3. **Mathematics (in L1 version)**

The performance in the Mathematics (in Mandarin Chinese) shows a more or less same average score for 3rd grade regular and bilingual. The coefficient of variation in bilingual school (32.2 percent) in this category suggests that the inequality is less in bilingual school compared to regular school (33.8 percent). However, the average score in regular school (17.2) for 6th grade is much higher than that of bilingual school (15.7) and the coefficient of variation also shows a greater consistency in regular school scores (35.7 percent) as against 41.1 percent in bilingual school. Over all in Mathematics (in Mandarin Chinese) also the score as well as the consistency in performance is better in regular schools as compared to bilingual school

Table 3-3 Mean, Standard Deviation and Coefficient of Variation: Mathematics (in L1 version)

	Mathematics (in L1 version)		
	Mean	**SD**	**CV**
Regular School 3rd grade	16.8	5.7	33.8
Regular School 6th grade	17.6	6.3	35.7
Regular School	**17.2**	**6.0**	**34.7**
Bilingual School 3rd grade	16.4	5.3	32.2
Bilingual School 6th grade	15.7	6.5	41.1
Bilingual School	**16.1**	**5.9**	**36.6**

4. **Mathematics (in L2 version)**

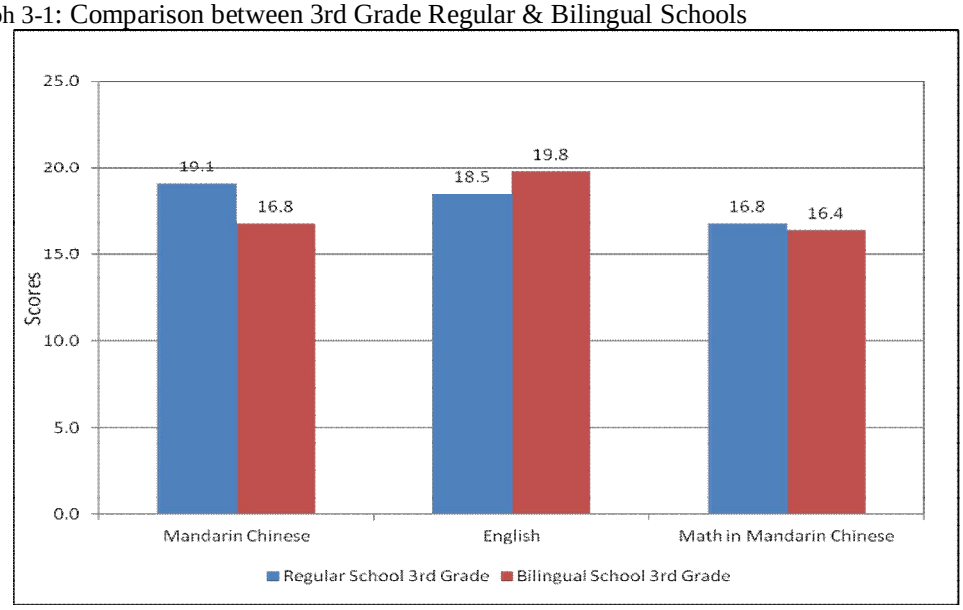
Mathematics conducted in L2 is not available in regular school. Therefore a comparison between regular and bilingual school cannot be made. However, the least average scores (13.6) as well as highest coefficient of variation (44.6) among two grades emphasis the difficulty level of understanding the Mathematics through English instructions in bilingual school.

Table 3-4 Mean, standard deviation and coefficient of variation: Mathematics (in L2 version)

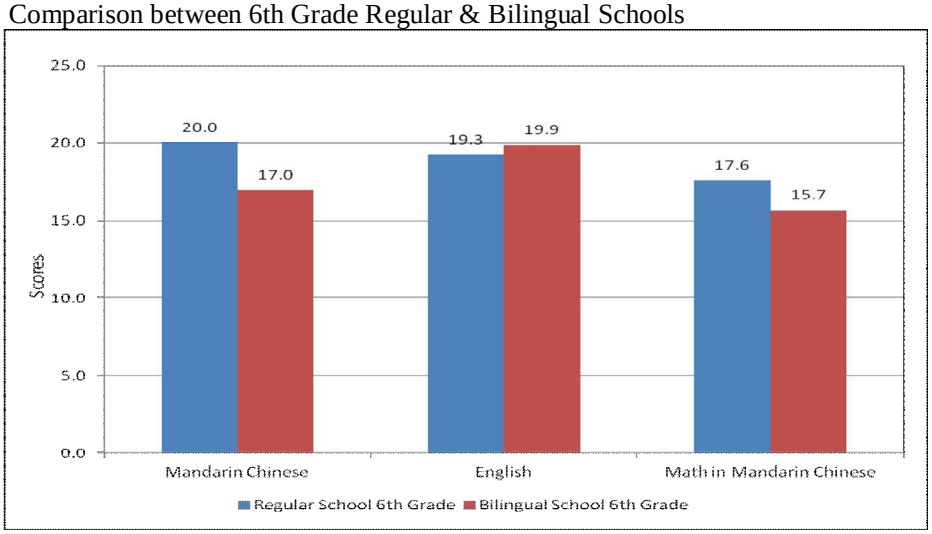
	Math (in L2 version)		
	Mean	SD	CV
Regular School 3rd grade	n.a	n.a	n.a
Regular School 6th grade	n.a	n.a	n.a
Regular School	**n.a**	**n.a**	**n.a**
Bilingual School 3rd grade	13.2	5.8	44.0
Bilingual School 6th grade	14.0	6.3	45.3
Bilingual School	**13.6**	**6.1**	**44.6**

The graphical representation depicted below shows the average score for 3rd grade, 6th grade and combined, for both regular and bilingual schools. As evident in the previous tables, the pattern of average scores in Mandarin Chinese for both 3rd and 6th grade has a sharp difference suggesting that regular school has a better performance. The average score for English subject is better in bilingual schools except 6th grade, where the performance in English is very close to each other. However, the Mathematics (in L1 version) do not have much difference in the average score as far as 3rd grade is concerned but this difference in grade is very sharp in both 6th grade as well as over all grades.

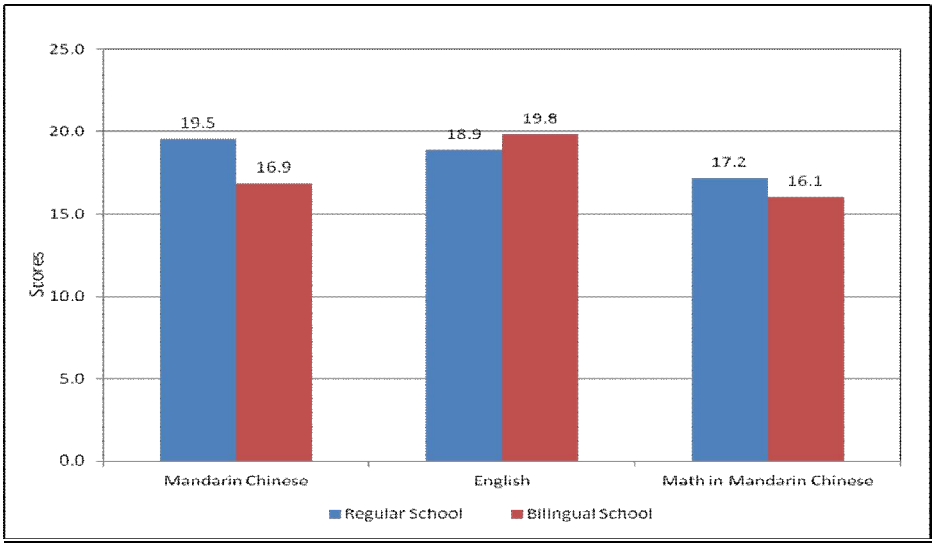
Graph 3-1: Comparison between 3rd Grade Regular & Bilingual Schools



Graph 3-2**:** Comparison between 6th Grade Regular & Bilingual Schools



Graph 3-3: Comparison between Regular & Bilingual Schools



Mean Comparison Test (t-Test)

In order to test the statistical significance in the difference in mean scores across subjects and grades an independent sample t-test is performed. The result obtained is presented in the flowing table. The independent t-test assumes that the variances of the two groups measured to be equal. The assumption of homogeneity of variance can be tested using Levene's Test of Equality of Variances, which is also presented here. Since in all the cases the value of F is insignificant and thereby we accept the assumption that the variance of the two groups is equal. It is observed here that the difference in mean score of 2.323 of Mandarin Chinese between 3rd grade regular and bilingual school is significant at 5% level of significance (to be precise at 2.3% los). In other words the score of Mandarin Chinese in 3rd grade is likely to be higher in a regular school when compared with bilingual school. The mean difference for Mathematics (in Mandarin Chinese) is 0.386 and that for English is -1.289. In these cases the difference in mean is statistically insignificant. This means that both the Mathematics (in Mandarin Chinese) and English do not differ significantly based on the type of school.

Table 3-5 Comparison of Mean and Independent Sample t-Test for 3rd Grade

School Type		N	Mean	SD	S.E
Mandarin Chinese	Regular School 3rd grade	82	19.07	6.463	.714
	Bilingual School 3rd grade	76	16.75	6.193	.710
English	Regular School 3rd grade	82	18.49	6.527	.721
	Bilingual School 3rd grade	76	19.78	6.740	.773
Math (in Mandarin Chinese)	Regular School 3rd grade	82	16.78	5.668	.626
	Bilingual School 3rd grade	76	16.39	5.274	.605

		Levene's Test		t-test for Equality of Means			
		F	Sig.	T	Df	Sig. (2-tail)	Mean Difference
Mandarin Chinese	a*	.548	.460	2.303	156	.023	2.323
	b*			2.307	156	.022	2.323
English	a*	.003	.954	-1.221	156	.224	-1.289
	b*			-1.219	154	.225	-1.289
Math (in Mandarin Chinese)	a*	.256	.614	.442	156	.659	.386
	b*			.443	156	.658	.386

Note: (1) Mean comparison test for Math (in English) cannot be derived as this subject is not available in regular school.

(2) a* stands for equal variance assumed; b* stands for equal variance not assumed.

A similar test is carried out to verify this for 6th grade and is presented below. It is observed here that the difference in mean score of 3.08 of Mandarin Chinese between 6th grade regular and bilingual school is also significant at 5% level of significance (to be precise at 1.6 % los). In the case of Mathematics (in Mandarin Chinese) and English, the difference in mean is 1.89 and -0.594. The t-value of 1.823 and -0.544 suggests that these differences are insignificant. Therefore in general, we can conclude that there is a difference in scores in regular and bilingual schools in the case of Mandarin Chinese language. The difference in score among regular and bilingual school is very insignificant in the case of Mathematics (in Mandarin Chinese) and English.

Table 3-6 Comparison of Mean between regular and bilingual 6th Grade

School Type		N	Mean	SD	S.E
Mandarin Chinese	Regular School 6th grade	78	20.04	8.025	.909
	Bilingual School 6th grade	73	16.96	7.462	.873
English	Regular School 6th grade	78	19.27	7.488	.848
	Bilingual School 6th grade	73	19.86	5.750	.673
Math (in Mandarin Chinese)	Regular School 6th grade	78	17.60	6.280	.711
	Bilingual School 6th grade	73	15.71	6.462	.756

		Levene's Test		t-test for Equality of Means			
		F	Sig.	T	df	Sig. (2-tail)	Mean Difference
Mandarin Chinese	a*	.675	.413	2.438	149	.016	3.080
	b*			2.443	148.9	.016	3.080
English	a*	10.757	.001	-.544	149	.587	-.594
	b*			-.549	143.6	.584	-.594
Math (in Mandarin Chinese)	a*	.582	.447	1.823	149	.070	1.890
	b*			1.821	147.7	.071	1.890

Note: (1) Mean comparison test for Math (in English) cannot be derived as this subject is not available in regular school.

(2) a* stands for equal variance assumed; b* stands for equal variance not assumed.

The Mathematics through English instruction is taught in the bilingual school only. A comparison can be drawn to understand whether the difference in average scores in mathematics differs significantly between Mandarin Chinese and English medium. The data here shows that in a bilingual school the students with mathematics in Mandarin Chinese would perform better than mathematics in English. The mean difference in scores of 3rd grade, 6th grade and school as a whole has a t – value of 10.7, 7.3 and 12.4 respectively which are highly significant at 1%.

Table 3-7 Mean Score and Mean Difference Comparison of Mathematics in Mandarin Chinese and Mathematics in English

	Math in Mandarin Chinese	Math in English	Mean Difference	t-value	Sig.
Bilingual School 3rd grade	16.4	13.2	3.2	10.7	0.000
Bilingual School 6th grade	15.7	14.0	1.7	7.3	0.000
Bilingual School	16.1	13.6	2.5	12.4	0.000

Analysis of Variance (ANOVA): Mandarin Chinese

A two-way ANOVA is generated to compare the mean differences of the scores that have been split on two independent variables school types and grades. It helps us to understand whether the independent variables (School and Grades) and their interaction (School * Grade) have a statistically significant effect on the dependent variable i.e, scores in Mandarin Chinese.

The descriptive statistics, ANOVA and the plot output is presented for each of the subjects.

Table 3-8 Descriptive Statistics: Mandarin Chinese

School Type	Grade	Mean	Std. Deviation	N
Regular School	3rd grade	19.07	6.463	82
	6th grade	20.04	8.025	78
	Total	19.54	7.260	160
Bilingual School	3rd grade	16.75	6.193	76
	6th grade	16.96	7.462	73
	Total	16.85	6.821	149

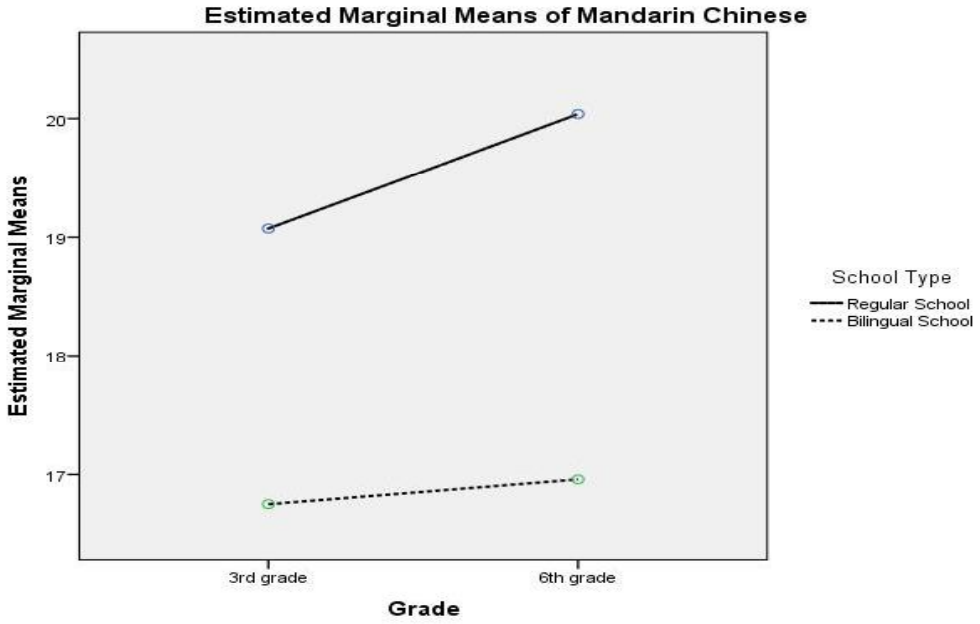
The average score in Mandarin Chinese for 3rd Grade in regular school is significantly higher (19.07) than that of bilingual school (16.75). In the case of 6th Grade also it can be observed the regular school has a better average score than that of the bilingual school.

Table 3-9 Analysis of Variance (ANOVA) Dependent Variable: Mandarin Chinese

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	597.735[a]	3	199.245	3.991	.008
Intercept	102228.836	1	102228.836	2047.588	.000
School	562.719	1	562.719	11.271	.001
Grade	26.579	1	26.579	.532	.466
School * Grade	11.029	1	11.029	.221	.639
Error (Residual)	15227.572	305	49.926		
Total	118696.000	309			
Corrected Total	15825.307	308			
a. R Squared = .038 (Adjusted R Squared = .028)					

The simple main effects analysis showed that the regular school had significantly higher score in Mandarin Chinese than bilingual school, F = 11.271 (p = 0.001), but the differences in the scores between 3rd and 6th grades are insignificant, F = 0.532 (p = 0.466). It can also be seen that there is a statistically insignificant interaction between the school and grades on the score in Mandarin Chinese, F (1, 305) = 0.221, p = 0.639.

Graph 3-4 Estimated Marginal Means of Mandarin Chinese



The above graph can be used to show the interaction effect. We can see from the plot that the lines are actually not crossing. This is because the interaction effect is statistically insignificant.

Analysis of Variance (ANOVA): English

The comparisons of average score suggest that the performance of English in bilingual school is better than that of regular school both gradewise and independently.

Table 3-10 Descriptive Statistics: English

School Type	Grade	Mean	Std. Deviation	N
Regular School	3rd grade	18.49	6.527	82
	6th grade	19.27	7.488	78
	Total	18.87	7.001	160
Bilingual School	3rd grade	19.78	6.740	76
	6th grade	19.86	5.750	73
	Total	19.82	6.254	149

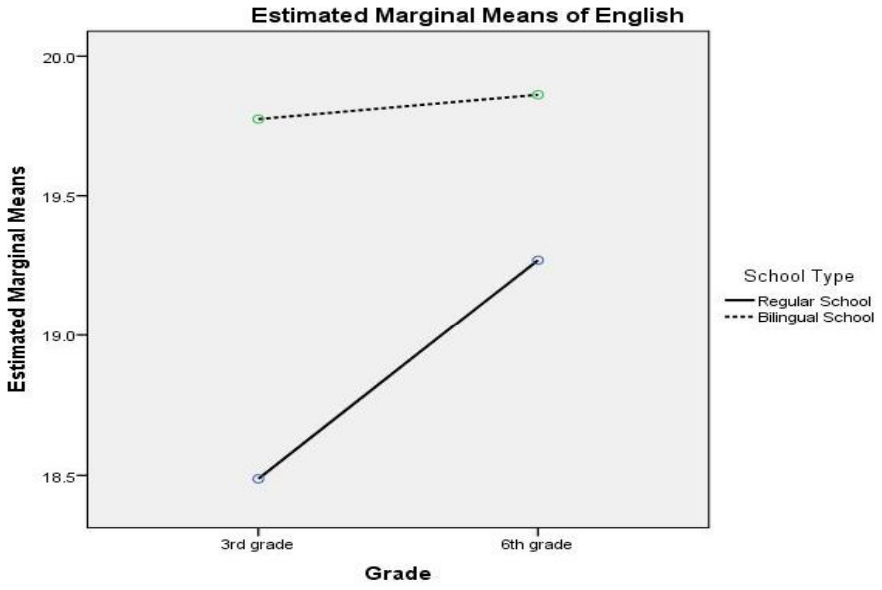
The relatively high dispersion in English scores in regular school both independently and across grades are higher than that of bilingual school suggest that the scores of English language in bilingual school is better than its counterpart .

Table 3-11 Analysis of Variance (ANOVA) Dependent Variable: English

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	94.326[a]	3	31.442	.707	.548
Intercept	115480.007	1	115480.007	2598.280	.000
School	68.303	1	68.303	1.537	.216
Grade	14.529	1	14.529	.327	.568
School * Grade	9.305	1	9.305	.209	.648
Error	13555.661	305	44.445		
Total	129070.000	309			
Corrected Total	13649.987	308			
a. R Squared = .007 (Adjusted R Squared = -.003)					

The F value of simple and interaction effects presented in the above table is statistically insignificant. The F value of 1.537 (p=0.216) is insignificant suggesting that the slight increase in the score of English in bilingual school than the regular school does not attract any statistical importance. The gradewise F value of 0.327 (p=0.568) and the interaction F value of 0.209 (p=0.648) is also very insignificant suggesting that the change in scores in English is not determined by the schools and the grades.

Graph 3-5 Estimated Marginal Means of English



Unlike the other subjects, we can observe here that the performance of English of bilingual school is better than that of regular school. One can also ascertain that within the schools the difference between 3rd grade and 6th grade for bilingual school is very marginal and that of regular school it is relatively higher. Again the unparalleled lines in the plot suggest that there is an insignificant interaction effect between schools and grades.

Analysis of Variance (ANOVA): Math (in Mandarin Chinese)

The average score in Mathematics (in Chinese) for 3rd Grade in regular school is 16.78 and that of bilingual school is 16.39 and there is no significant difference.

Table 3-12 Descriptive Statistics: Math (in Mandarin Chinese)

School Type	Grade	Mean	Std. Deviation	N
Regular School	3rd grade	16.78	5.668	82
	6th grade	17.60	6.280	78
	Total	17.18	5.969	160
Bilingual School	3rd grade	16.39	5.274	76
	6th grade	15.71	6.462	73
	Total	16.06	5.876	149

However in the case of 6th Grade it is observed the regular school has a significantly better average score of 17.6 than the score of 15.71 for the bilingual school. It suggest that as the grade increases the regular school is likely to have better scores for Mathematics (in Mandarin Chinese)

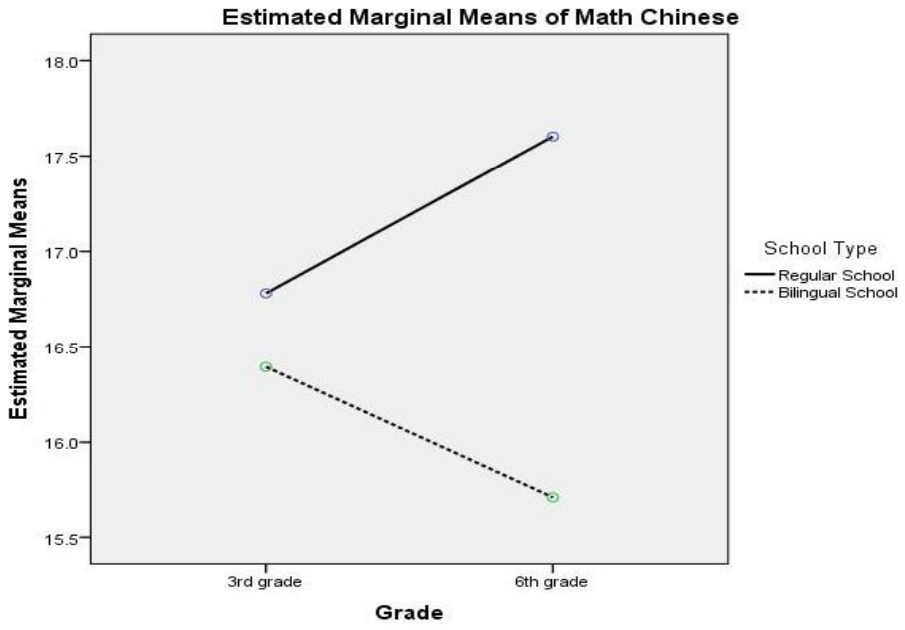
Table 3-13 Analysis of Variance (ANOVA) Dependent Variable: Mathematics (in Mandarin Chinese)

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	141.281[a]	3	47.094	1.338	.262
Intercept	85227.524	1	85227.524	2422.174	.000
School	99.863	1	99.863	2.838	.093
Grade	.376	1	.376	.011	.918
School * Grade	43.636	1	43.636	1.240	.266
Error	10731.845	305	35.186		
Total	96440.000	309			
Corrected Total	10873.126	308			
a. R Squared = .013 (Adjusted R Squared = .003)					

The simple main effects analysis showed that the regular school had higher score in mathematics in Mandarin Chinese than bilingual schools with an F value of 2.838 which is moderately significant though at 10% level (p = 0.093). However the F value of 0.011 (p=0.918) shows that the mathematics (in Mandarin Chinese) scores in terms of grade is statistically insignificant. In other words, it does not differ significantly across grades.

The interaction effect between the type of school and grades on score in mathematics (in Mandarin Chinese) also suggest that the difference is statistically insignificant with an F value of 1.24 (p = 0.266). The overall model F Value of 1.338 (p=0.262) suggest that there is no significant statistical evidence of difference in scores of mathematics (in Mandarin Chinese) across schools and grades.

Graph 3-6 Estimated Marginal Means of Math (in Mandarin Chinese)



The above graph illustrates that the Mathematics (in Mandarin Chinese) scores in 6th grade for regular school is higher than that of 3rd grade and that of bilingual school there is a sharp decline from 3rd grade to 6th grade. The unparalleled lines in the plot suggest that there is a marginal interaction effect although the lines are actually not crossing.

School wise Correlation coefficients between subjects

The linear correlation further helps us to understand the linear relationship between the scores in various subjects. The correlation coefficient captured through the following tables clearly indicates that Mandarin Chinese is highly correlated with English and Mathematics (in Mandarin Chinese) both in the case of regular and bilingual school. Since a strong correlation is established between Mandarin Chinese and all other subjects it is imperative to understand their degree of relationship.

Table 3-14 Correlation - Regular School

	Mandarin Chinese	English	Math (in Mandarin Chinese)
Mandarin Chinese	1		
English	.915**	1	
Math (in Mandarin Chinese)	.857**	.807**	1

* Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

Table 3-15 Correlation - Bilingual School

	Mandarin Chinese	English	Math (in Mandarin Chinese)	Math (in English)
Mandarin Chinese	1			
English	.857**	1		
Math (in Mandarin Chinese)	.841**	.729**	1	
Math (in English)	.853**	.773**	.917**	1

* Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

Table 3-16 Gradewise Correlation Coefficients between Subjects for 3rd Grade of Regular School

	Mandarin Chinese	English	Math (in Mandarin Chinese)
Mandarin Chinese	1		
English	.906**	1	
Math (in Mandarin Chinese)	.843**	.783**	1

* Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

The linear correlation presented above is for regular school 3rd grade. Here the correlations between all the subjects are positive and statistically highly significant. It

shows that with the increase in one score each of the other score also tend to increase as is evident from the correlation value of 0.843 and 0.906 respectively for Mathematics (in Mandarin Chinese) and English.

Table 3-17 Gradewise Correlation Coefficients between Subjects for 6th Grade of Regular School

	Mandarin Chinese	English	Math (in Mandarin Chinese)
Mandarin Chinese	1		
English	.923**	1	
Math (in Mandarin Chinese)	.869**	.826**	1

* Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

A similar correlation can also be seen for 6th grade in regular school. One can observe that the correlation between Mandarin Chinese and all other subjects are positive and highly correlated. Here the correlation of Mandarin Chinese with Mathematics (in Mandarin Chinese) and English is 0.869 and 0.923 respectively, which implies again that an increase in the score of Mandarin Chinese in all likelihood will result in the increase in scores in other subjects and vice versa.

Table 3-18 Gradewise Correlation Coefficients between Subjects for 3rd Grade of Bilingual School

	Mandarin Chinese	English	Math (in Mandarin Chinese)	Math (in English)
Mandarin Chinese	1			
English	.864**	1		
Math in Mandarin Chinese	.815**	.759**	1	
Math in English	.829**	.803**	.894**	1

* Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

In the correlation table for 3rd grade bilingual school the scores of Mathematics in English is also included (it was not available in regular school). The correlation for Mathematic (in Mandarin Chinese), English and Mathematics (in English) with Mandarin Chinese are respectively 0.815, 0.864 and 0.829. Again these values are very high and positive suggesting that with increase in Mandarin Chinese the scores in other subjects also tend to increase.

Table 3-19 Gradewise Correlation Coefficients between Subjects for 6th Grade of Bilingual School

	Mandarin Chinese	English	Math in Mandarin Chinese	Math in English
Mandarin Chinese	1			
English	.875**	1		
Math in Mandarin Chinese	.863**	.727**	1	
Math in English	.874**	.755**	.951**	1

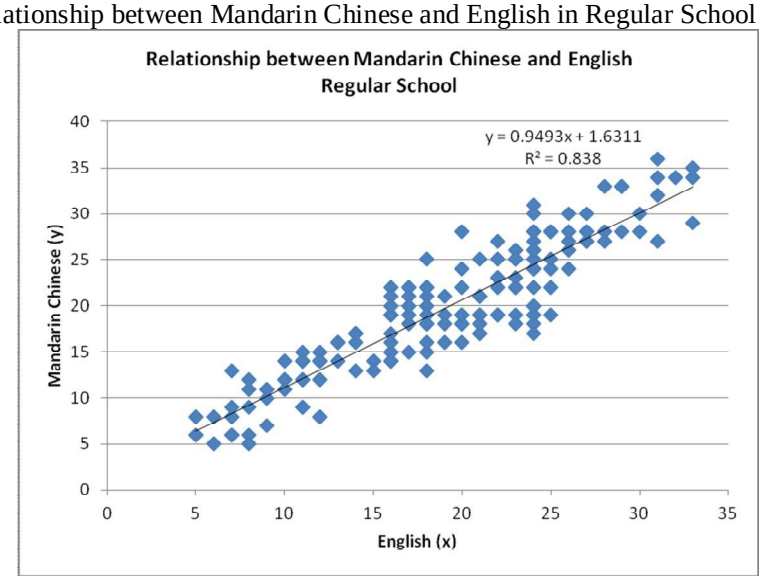
* Correlation is significant at the 0.05 level (2-tailed). **. Correlation is significant at the 0.01 level (2-tailed).

In the correlation table for 6th grade bilingual school one can easily observe that all mutual correlations are positive and highly significant at 1 % level of significance. The correlation for Mathematic Chinese, English and Mathematics English with Mandarin Chinese are respectively 0.863, 0.875 and 0.874. In general it can be said that an increase in scores in any of the subject will increase the scores in other subjects both school and gradewise.

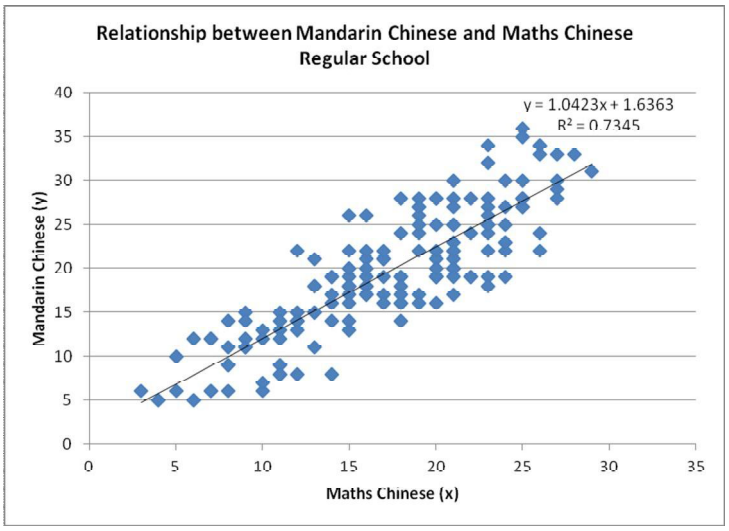
Regression Model and Scatter Plot

In order to understand the degree of relationship, a scatter plot with trend line is generated by taking Mandarin Chinese on y axis and the other subjects on x axis. This is done to estimate the percentage of variance in Mandarin Chinese explained by other subjects. It is evident from the plot that all subjects have a significant influence on the percentage of variance in Mandarin Chinese. The percentage variance is highest for Mandarin Chinese and English for regular school. This shows that English subject in regular school explains an 83.8 percent variance in Mandarin Chinese. In the case of bilingual school it is about 73.4 percent. Similarly the Mathematics (in Mandarin Chinese) also explains a percentage of variance of 73.4 for regular school than its bilingual counterpart (70.6). A comparison for Mathematics (in English) cannot be made as it is available in bilingual schools only. However it explains a 72.7 percent variance which clearly shows that both are strongly associated. The functional relationship for all these plots is also shown in the form of an equation.

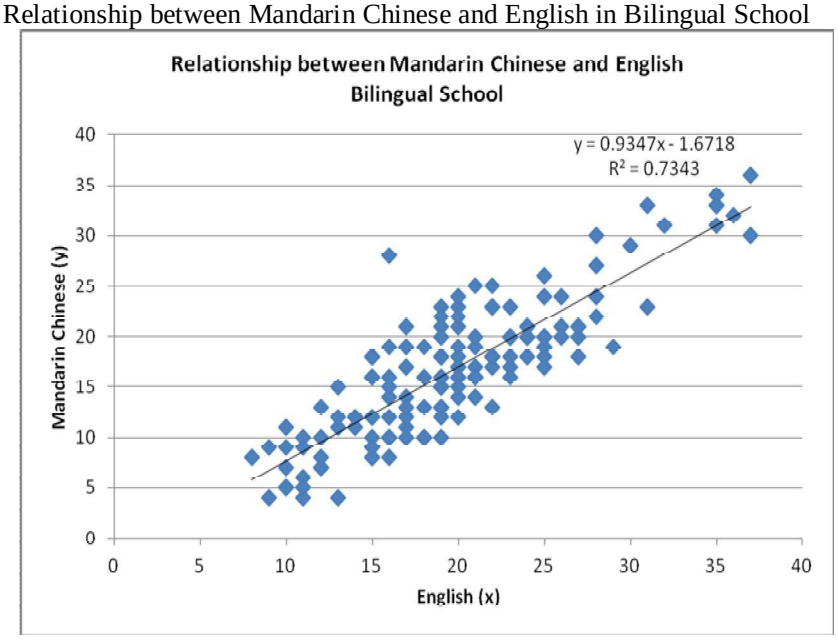
Graph 3-7 Relationship between Mandarin Chinese and English in Regular School



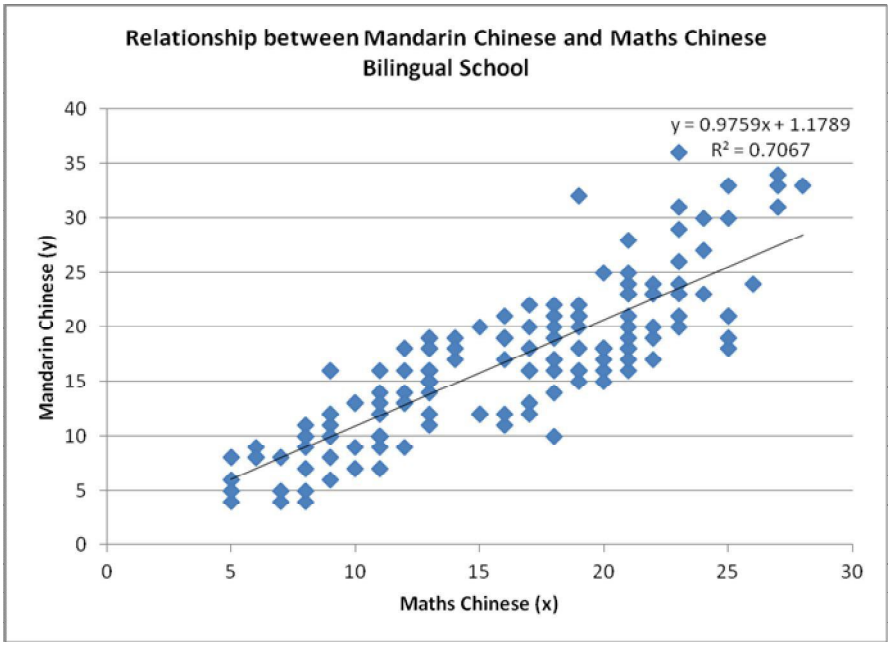
Graph 3-8 Relationship between Mandarin Chinese and Math (in Mandarin Chinese) in Regular School



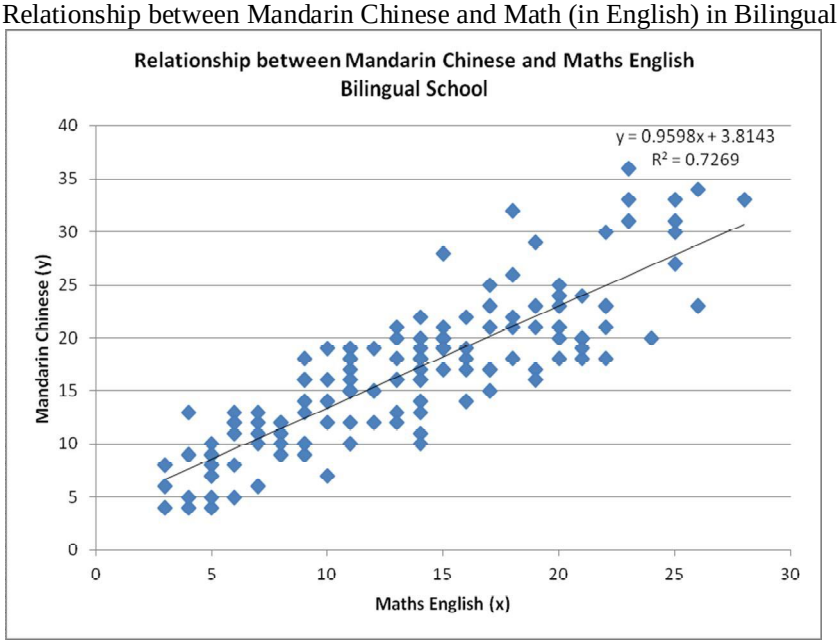
Graph 3-9 Relationship between Mandarin Chinese and English in Bilingual School



Graph 3-10 Relationship between Mandarin Chinese and Math (in Mandarin Chinese) in Bilingual School



Graph 3-11 Relationship between Mandarin Chinese and Math (in English) in Bilingual School



3.2 Qualitative Data Analysis

Following the quantitative analysis, qualitative data from experimental classrooms were collected in order to enable the interpretation of the former. Accordingly, the focus of this research was moved to classroom observations to attempt to discover more about the variables, and how students take initiatives in class. This aimed to provide more details on the teaching and learning process.

3.2.1 Classroom Settings

Print Rich Classroom

In both school types, the classrooms observed were similar to those seen in many educational catalogues. The walls of the classrooms held printed material, signs and bulletin boards full of students' work. However, the difference was in the language in which these were presented.

In the campus of bilingual school, rules of conduct, reading material and directions were mostly in English and very few in bilingual forms. The materials found in L1 in the bilingual school were mostly to do with health warnings (for example , 'Ways to Prevent Avian Flu'), whereas as all the academic and general instructions were

in English. Thus, the explicit print ecology of the bilingual school was dominated by L2. Much of the wall space in the classrooms was devoted to students' individual work in L2, with some short essays and compositions also in L1. In the regular school, however, there was more space for students' work in L1 than in L2. Besides students' work, there were some educational posters displayed on classroom walls of both third- and sixth-grade classrooms in both the types of schools. Most of these consisted of colourful pictures with L2 vocabulary and other texts to facilitate English learning.

Photo 3-1 Third-grade classroom of regular school

Photo 3-2 Sixth-grade classroom of bilingual school.

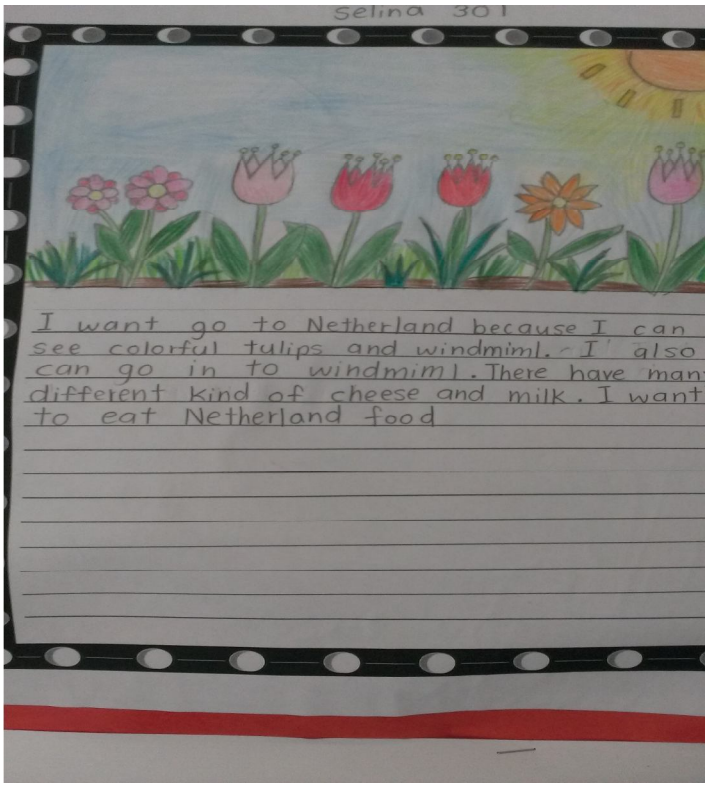


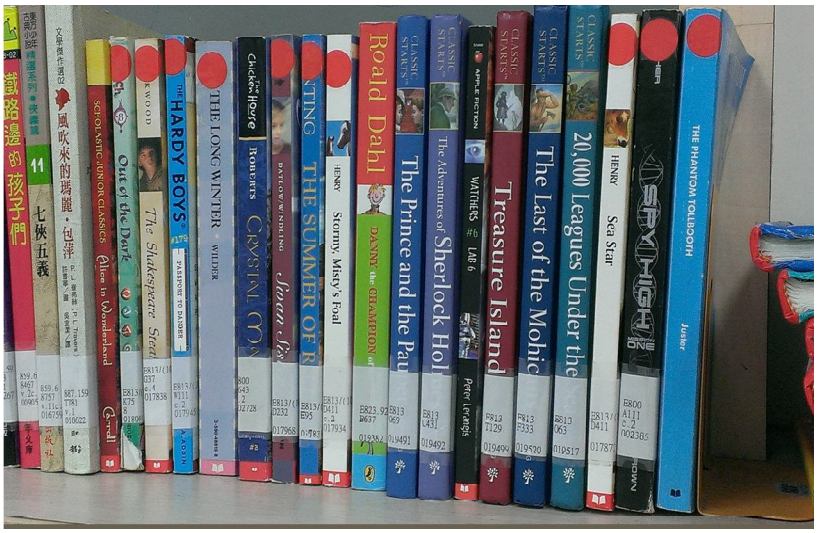
Photo 3-3 Sixth-grade classroom of bilingual school

In bilingual school, the wall displays were not just found inside the classroom but outside as well. During our observation period, the bilingual school was running a programme called ‘Festival of Foreign Cultures’. Much of the wall space outside the classroom was also devoted to different cultures where English was primarily used to convey the details. Cetin and Flamand (2012) found that English as a foreign language (EFL) posters in the classroom facilitate L2 vocabulary learning. It is believed that hanging posters still have pedagogical effectiveness even when the students are not directed explicitly by their teacher to pay attention to them. The students of the bilingual school clearly had more chances to immerse themselves in L2 environments than their counterparts in the regular school.

There were some books available for students in classrooms in both schools. However, due to the limitation of classroom space, there was no ‘reading corner’ in either school. In other words, students had to take the books back to their seats to read. In the regular school, there were seldom English books available in the classrooms. More English books were found in the classrooms of the bilingual school. Apart from books, the bilingual school was found to have an abundance of English magazines, newspapers, TV programmes, movies and VCDs of English songs. The resources in Mandarin Chinese and English were half and half. However, the books and DVDs that

occupied most of the shelf space in the library of the regular school were in Mandarin Chinese (about 80 per cent).

Photo 3-4 Third-grade classroom of bilingual school



Class Size and Seating Arrangements

Class size is viewed as a significant factor in determining the extent to which students engage in activities during class. There were about 25 to 30 students in each class of the bilingual school, whereas there were 40 to 45 students per class in the regular school, where the number of students was viewed as a large class (Holliday 1996). It was observed that some students easily disengaged from the learning process, probably because of the large class size of the regular school.

The arrangements of seats and the use of classroom space were different in both the types of schools. In the regular school, all students studied in the same classroom except for physical and music courses, while their bilingual school counterparts had more courses, such as computer classes, not running in the same classrooms. In other words, in the classes observed for this study, all students were given their lessons in L1, L2 and mathematics in the same classrooms.

In both types of schools, students' desks were arranged in the middle of the classroom. They sat in several parallel rows according to their height. The shorter students were assigned to the front seats while the taller one sat in the back rows. Boys and girls were randomly seated and there was no binary male–female segregation. Pairs

of students sat together and faced the teachers and the whiteboard. Having seats in rows made it difficult to have group discussions (Cazden 2001). The pairs of desks did not touch each other and there was a narrow space between them that allowed teachers to walk around the classroom freely. In all the classes, teachers stood in front and faced the students. All teachers stood while teaching. Most of the time, teachers stood in front and they moved to students when they needed to monitor their work. During this time, students received individual guidance from the teacher.

The rooms that contained 40 to 45 students in the regular school seemed crowded. There was no room for group activities. Teachers were found to have more difficultly moving around in the cramped space when monitoring students. It was observed that teachers in the regular school did not walk to each student, especially those who sat at the back. The students who caught the teacher's attention were those who sat in the front and middle rows. The arrangement in the bilingual school, where teachers had more room to walk around, is a student-centre manner, helping teachers interact with each individual student (Shores, Gunter and Jack 1993).

The parallel rows of desks were not good for students to work together in group projects. Discussion demands a seating arrangement in which students can easily see each other's faces (Evertson, Emmer and Worsham 2003). The following picture was taken in a mathematics class of the third grade in the bilingual school. When students were assigned to work together in a group of six or eight, most of them had to stand up and walk to other students to discuss things. At that time, the class became a mess.

One teacher's desk was available in each classroom in both schools. However, the location of desk was different. In the regular school, it was located in the front of the classroom, while it was in the back in the bilingual school. When teachers were teaching in class, the tutors sat at their desks for paperwork and sometimes monitored students. During the break, the researcher asked to sit at the teacher's desk and found that it allowed tutors to keep the entire classroom in sight at all times. However, equipment such as computers and overhead projectors easily distract students (Evertson, Emmer and Worsham 2003). Therefore, it should be better to have the teacher's desk at the back of classroom, which tends to prevent students from being distracted.

From this, it was found that the bilingual school students tended to attract more teachers' attention and had more chances to participate in classroom activities than their counterparts in the regular school.

In the following two sections, the focus will be on the processes of teaching in English and maths classes. This will lead to an understanding that may contribute to different learning outcomes from the two types of schools.

The English Class

The primary aim of classroom observations was to investigate the current classroom pedagogical practices and how teacher–student interactions happened. The findings showed that the classes in both schools had mainly teacher-centred, student-supported interactions.

Regular School

The textbooks used in regular school were designed locally. The contents comprised real-life material, such as going shopping, surfing the internet and travelling abroad. Teachers in charge of the English class in the regular school were native Mandarin Chinese-speaking teachers. They had majored in English in undergraduate and postgraduate levels and were certified teachers. As per the 10 classes observed, the English classes in the regular school were found to be mainly divided into five: greetings, reviews, lectures, activities and songs. The observations also addressed the context and time when the teachers switched languages during the teaching process.

Greetings

When teacher came into the classroom, a greeting was always the first activity in the English class of the third and sixth grades in the regular school. The greeting was in English. As shown in Extract 1, this is a typical model used in EFL classes in Taiwan. When the teacher came into the class, the class leader initiated a typical Chinese ritual, and led the whole class to greet the teacher in English. This is a fixed greeting form between the teacher and students. According to the experiences of the researcher herself, students tended to give positive answers no matter what they really felt.

Extract 1: Third Grade of Regular School

[Class stands up and bows.]
Students: Good morning, Miss Lin.
Teacher: Good morning. How are you?
Students: I'm fine.
Teacher: Good.

After the fixed greeting, the teachers were found to ask more questions to the whole class, specially sixth graders (Extract 2). These questions were found to be real ones according to current situations. These questions were in line with what Hymes (1972) proposes: that language should be taught for communicative purposes to help learners achieve communicative competence. In Extract 2, in addition to practising real conversations, students also learnt the correct usage of the word 'work'.

Extract 2: Sixth Grade of Regular School

[Class stands up and bows.]
Students: Good morning, Miss Wang.
Teacher: Good morning. How are you?
Students: I'm fine.
Teacher: That's great. What day is it today?
Students: Today is Friday.
Teacher: Time passes so soon. The weekend is coming. Are you happy?
Student 1: Yes.
Student 2: No.
Teacher [facing one boy]: Why do you say no?
[Students laugh]
Teacher: Why do you say no?
Student 2: Many work to do.
Teacher: I know you have *much* work to do. You have *much* work to do because you have to study, right?
Students: Yes.
Teacher: Very good.

The sixth-grade students had also learnt to distinguish between ‘much’ and ‘many’. This teacher stressed on ‘much’ to remind students of its correct usage instead of directly correcting this student’s mistake by saying that ‘many work’ was wrong. Traditionally, ‘keeping face’ is an important facet of Taiwanese culture. If students are corrected in front of the whole class, they may be afraid of answering questions in the future. The teacher knew the significant of this and said ‘much work’ twice to set the correct model for students to follow instead of directly correcting the student’s grammatical mistake.

From the smooth of conversations between the teacher and students, it could be assumed that the students were familiar with the questions asked by the teachers. The teachers also took this opportunity to review what students had learnt previously. Through this, students were provided with the opportunity to practise real conversations for communicative purposes. This may have prepared them for real communication in English.

Reviews

Every EFL class in the regular school reviewed what had been taught in the previous lesson. This is regarded as an important educational concept in Taiwan. Teachers were found to spend up to 10 minutes to help students review what they had learnt from the previous class. The activities for reviews were different, depending on the teacher. Mostly, the focus was on vocabulary and grammar. To the teachers, the function of the review was to evaluate how well students had learnt the previous lessons. This helped them to know what problems they had encountered and to place special emphasis on these. For students, reviews helped them know how well they had imbibed the previous lesson and, furthermore, use what they had learnt in a new lesson.

Extract 3 is from the third-grade classroom of the regular school. After the greeting, the teacher asked if the students had memorised the words assigned as homework in the previous class. The English translation is included in brackets.

Extract 3: Third Grade of Regular School

[Students stand up and bow.]

Students: Good morning, Miss Lin.

Teacher: Good morning. How are you?

Students: I'm fine.

Teacher: *Dan zih bei hao le mei?* (Have you memorised the vocabulary list?)

Teacher: Student number 5, *jiao ta che* (bicycle).

Student no. 5: Bicycle.

Teacher: How do you spell it?

Student no. 5: B-i-c-y-c-l-e.

Teacher: *Da sheng dian rang da jia dou ting dao*. (Loudly. Make yourself be heard by everybody.)

Student no. 5 [louder]: B-i-c-y-c-l-e.

Teacher: Very good. Student number 32, *ke ting* (living room).

Student no. 32: Living room.

Teacher: How do you spell it?

Student no. 32: L-i-v-i-n-g r-o-o-m.

Teacher: Very good. Student number 12, *hua yuan* (garden).

Student no. 12 [stands up and keeps silent].

Teacher: G *kai tou* (start with 'g').

Student no. 12 [still silent].

Teacher: *Hua yuan*, everybody? (Garden, everybody?)

Students [in a low voice]: Garden.

Teacher: 'Everybody' *shih shen me yi sih? wo shang cih you jiang guo.* (What does 'everybody' mean? I mentioned it last time.)

Students: *Mei ge ren* (everybody).

Teacher: *Hen hao, dang wo shuo* 'everybody' *shih, jiou shih yao da jia yi ci lai, zai yi cih*. Garden, everybody. (Very good. When I say 'everybody', I ask the whole class to do it together. Once again. Garden, everybody.)

Students: Garden.

Teacher: How do you spell it?

Students: G-a-r-d-e-n.

Teacher: Very good.

Instead of using English, this teacher, being an English language learner herself, posed a question in L1 to ask if students had memorised the vocabulary list. The reason this teacher switched languages was that students were not supposed to know the word 'memorised' (背 in L1). She, therefore, used L1 to make her message comprehensible. This was the same reason why she switched to L1 again later. She also mentioned the word 'everybody' in English first and elaborated on this word in L1 later. Code switching in this manner is often used in EFL classrooms or multilingual settings (Setati 1998). After she was sure that all students caught the meaning of this word, she applied it to the spelling activity immediately. Clearly, the students successfully followed her instructions. Whenever a student gave a correct answer, the teacher accepted and confirmed the response by saying 'very good', 'excellent' and 'wonderful', which are identified as positive feedback by Llinares-Garcia (2005). This can be used as positive reinforcement and motivation booster for the students (Van-Dijk & Kluger 2000). In the process of being given praise, students' self-esteem is raised (Elwell and Tiberio 1994). Besides vocabulary, the teacher of the third grade continued to review what students had learnt in the previous class based on the textbook. Extract 4 is from a lesson on 'What Do They Do?' Students learnt to match jobs to places.

Extract 4: Third Grade of Regular School

Teacher: Where does a nurse work?
Students: A nurse works in a hospital.
Teacher: Where does a doctor work?
Students. A doctor works in a hospital too.
Teacher: Very good. What time do we eat lunch?
Students: We eat lunch at 12 o'clock.
Teacher: We all know Haley, right?
Students: Yes.
Teacher: The little girl we knew in our textbook, remember?
Students: Yes. [Some hurry to open their textbooks]
Teacher: What time does Haley get up?
Students: She gets up at six o'clock.
Teacher: What does Haley love?
Students: She loves music.

Lecture

The teacher spent 10 to 15 minutes warming up the class by greeting and reviewing what students had learnt in the previous lesson. Then the teacher moved on to the new lesson. Grammar is viewed as a very important part of English teaching in Taiwan (Chen 2001). Without any doubt, most of the class time was found to be taken up by grammar explanations in the English class of the regular school. L2 teaching falls on a more skills-based approach.

Extracts 5, 6 and 7 are the typical models of grammar lessons in the regular school. Teachers always used L1 to explain grammar to students, whether in third or sixth grade. In Extract 5, Miss Wang explained to the sixth graders about the rules about putting 'the' before words like violin, drums and trumpet. The English translation is included in brackets.

Extract 5: Sixth Grade of Regular School

Teachr: *You mei you kan dao violin cian mian you yi ge* the*? Ba cyuan ci lai huo hua sia lai. Jhih yao shih jiang dao yue ci, dou yao zai cian mian jia* the. (Have you noticed there is one *the* before violin? Circle it or underline it. We have to add *the* before any instruments.) Ok, who can play any *yue ci* (instruments)? Please raise your hand.

[Several hands go up.]

Teacher: Okay. What can you play? [Pointing to one student]

Student: I can play the piano.

Teacher: Is it fun?

Student: Yes, it is much fun.

Teacher: Who else? Ok, it is Syu Jie's turn. What can you play?

Student: I can play the piano too.

Teacher: Wow, learning the piano is very common. Who can play the piano? Raise your hand.

Later, Miss Wang wrote down some words on the board: violin, drum, flute, trumpet, triangle, recorder, guitar. She explained the meanings of these instruments in L1 and taught students how to pronounce these words. In fact, students of the sixth

grade are supposed to know the sentence patterns like, 'What can you play?' and 'What are you playing?' The teacher combined what students knew (sentence patterns) and what they had just learnt (the '+instrument') for practice.

Extract 6: Sixth Grade of Regular School

Teacher: Okay, let's practice the sentences together. What can you play?
[Pointing to the word *drums*]
Students: I can play the drums.
T: What are you playing? [Pointing to *recorder*]
Students: I am playing the recorder.
[The exercise was repeated with different words on the board.]

In the case of 'excited' and 'exciting', Miss Wang also used L1 to explain how to use these two words correctly and later provided students with more practice (Extract 7). In general, students did the practice in chorus, not individually. This was probably due to the large size of class.

Extract 7: Sixth Grade of Regular School

Teacher: *Ruo shih jhu cih shih ren, jiou shih shei jyue de ru he, jiou yao jia* ed. *Siang* I feel excited. *Wo hen sing fen.* Mary is bored. Mary *hen wu liao*. John *hen lei. Ru guo jhu cih shih shih wu, jiou yong* ing. (If the subject is people, that is, who feels, you have to add *ed*. Like, *I feel excited*. Mary is bored. John is tired. If the subject is a thing, not people, then use *ing*).
[The teacher writes down some sentences on the board:

1. This game is _____
2. Tom is _____ because he has nothing to do.
3. This book is _____
4. This movie makes me _____]

Teacher: Question 1. Boring or bored, what is the answer?
Students: Boring.
Teacher: Very good. Boring or bored? [Pointing to question 2]

Students: Bored.

Teacher: Answer this. [Pointing to question 3]

Students: Boring

Teacher: Last one?

Students: Boring, bored.

Teacher: Boring or bored?

Students: Boring, bored

Teacher: *Jhe ge zih shih zai shuo shei, shih dian ying, hai shih wo jhe ge ren? Shei jyue de?* (What does this word refers to? This movie or me?)

Students: Me.

Students: Bored.

This kind of grammar teaching is defined as the deductive method. In it, a grammatical structure is presented initially before any examples are made (Dekeyser 1994). The deductive method is suggested as a better way to help learners acquire grammar knowledge (Robinson 1996). Teachers explain grammar concepts in L1 to compare and contrast it, which may be because the grammar concepts were more complicated and beyond students' English proficiency level.

The teacher does not always have the main role. Sometimes students are the focus in class. Whenever teachers started to explain something, they were found to ask if anyone in the class knew the answer. If someone raised their hand, they would be called as a 'subordinate teacher' (*siao lao shih* in Mandarin Chinese) to teach whole class. The concept of a subordinate teacher in Taiwan is similar to peer tutoring, which is suggested as an effective way of having higher-performing students assist others with teaching (Burns 2006). Peer tutoring provides students with an opportunity to learn from their classmates rather than from only the teacher. Students may feel more comfortable with classmate tutors than with teachers (Grubbs and Boes 2009). In the process of instructional activities, student tutors are also trained in their abilities to explain. Accordingly, tutors and tutees both benefit from the activity simultaneously. The following is from the sixth grade of the regular school. The teacher talked about the sentence, 'God bless you' and asked someone to explain why there was no need to put 'es' after 'bless'.

Extract 8: Sixth Grade of Regular School

Teacher: Look at this. Why don't we have *es* here? [Repeats in L1] Please raise your hand. Good. Meng Chen, *shih wo men jhe ge wun ti de siao lao shih* (Meng Chen is our subordinate teacher for this question). Please, Meng Chen.

Meng Chen: *Yin wei zai* God *de cian mian sheng lyue le may* (Because there is an ellipsis of *may* in front of god).

Teacher: Excellent. *Suo yi ji de sia cih kan jian jhe ge jyu zih de shih hou bu yao shuo ta sie cuo le* (So remember next time when you see this sentence, don't say it is written incorrectly).

In the third grade, teachers were found to use more body language and pictures while teaching. The teacher explained the different usages of prepositions, like 'on', 'in', 'near', 'under' and 'above'. She held one book in her left hand and one pen in her right, and asked the whole class to follow her gestures. This is in accordance with a technique called Total Physical Response (TPR), developed in the 1960s, based on the assumption that the memory is enhanced through association with physical movement.

Extract 9: Third Grade of Regular School

Teacher: The pen is under the book.
Students: The pen is under the book.
Teacher: The pen is near the book.
Students: The pen is near the book.
Teacher: The pen is above the book.
Students: The pen is above the book.

Pronunciation is also viewed as an important part in EFL classes in Taiwan. In the regular school, teachers were found to use phonics to teach students pronunciation. Phonics is a method of teaching to read in which learners are taught to recognise the sounds that letters represent. Teachers were found to lead the whole class in reading the sentences and the texts together. Usually, teachers read the sentences first and students

followed. Later, students were asked to read the same themselves in chorus. This can be identified as the Audio-Lingual Method, which is based on the theory of behaviourism, and it assumed that students can be trained using a system of reinforcement.

Activities

Role play was the most popular activity adopted for English conversation practice in the third and sixth grades of the regular school. After one lesson was taught, the students were asked to do role play for more practice. Role play belongs to the Situational Language Method of teaching. This activity provides students with authentic situations that they may encounter in their life. Besides, this activity also helps them use the target language to solve problems. Teachers used the role-play activity in order to help the less motivated learners take part in the lesson.

In the sixth grade, students had completed the lesson called ‘A Wonderful Trip’. The teacher also played a video to show the class how to go through customs at the airport in the English-speaking country. The teacher wrote down the following extract and explained each sentence in L1, and finally led the whole class in repeating the passage in chorus. After this, the students were asked to fill the blanks by asking one another. Later, six students were picked randomly by the teachers to do the role-play practice in front of the whole class. They were divided into two groups. In each group, one played the customs officer, and the other two played passengers. The questions asked by the customs officer were fixed, but the passengers gave varied answers as they liked. The dialogues went as follows:

A: Why have you come here?

B: I have come here for ____.

A: How many days will you stay here?

B: _____

A: Is this your first time here?

B: _____

A: Where will you stay?

B: I will stay in _____

A: Who will you stay with?

B: I will stay with _____

A: Enjoy your stay here.

B: Thank you, I will.

Apart from this, the 'information gap' activity was a commonly used task in the sixth grade, though not in the third grade. This activity was used to enhance the students' communicative competence. It helps learners use the target language to achieve a real outcome (Willis 1996). Teachers first divided students into several small groups and asked each group to discuss the questions. Several minutes later, one student from each group was randomly picked to present the result of their discussion. In this activity, students were not allowed to use mobile phones to look up the dictionary. Instead, they were asked to use what they had learnt to present their ideas. However, this activity was not undertaken for each lesson. During the classroom observation, the questions given by the teacher in the sixth grade included:

1. In your opinion, how do you make a foreign friend?
2. Please choose one country that you have ever visited and tell us how you like it.

Although students were asked to discuss in L2 as much as they could, they were sometimes found to use L1 instead. This mixing of languages was not forbidden. Students were found to discuss how to translate certain L1 phrases to L2, and to write down the sentences on paper. Since any student could be picked up by the teacher, each student in each group needed to take part in the discussion. If students made mistakes in English, they were not stopped by the teacher. After they finished their presentation, the teachers led the whole class in repeating the correct sentences together. The teachers gave the students opportunities to express what they wanted to irrespective of whether it was wrong or right. Later, the teacher still provided the students with the correct answers in English. It seems that fluency comes before accuracy. Students were found to take part in the activity enthusiastically. This finding echoes the statement that authentic materials and content motivate students more (Hadley 2001).

In both third and sixth grades, drill practice was always found in the English classes of the regular school. However, the third graders tended to have more drill practice than the sixth graders. Extracts 10 and 11 illustrate the drill pattern that often took place in the EFL classes of the regular school.

Extract 10: Third Grade of Regular School

Teacher: Do you like studying?
Students: Yes, I do. I like studying very much.
Teacher: Do you like cheating?
Students: No, I don't. I don't like cheating.
Teacher: Very good. I am proud of you all.

Extract 11: Third Grade of Regular School

Teacher [picking up a book]: What is this?
Students: It is a book.
Teacher [pointing at one part of the cover of that book]: What is its colour?
Students: It is green.
Teacher: Do you like green? Yes.
Students: Yes, I like green.

Thus, the teacher helped students practise sentence patterns such as 'What is this?', 'It is a [+ noun]', 'It is [+ adjective]' and 'Do you like…?' When the teacher picked up one book and asked the whole class questions like, 'What is this?' and 'What is this colour?', she knew the answers already. When the teacher posed questions to students, she also provided hand gestures to the whole class to indicate whether the answer must be positive or negative. Students answered according to the teacher's gestures. This mode of drill practice was used in EFL classes very often. When students learnt one new sentence pattern, this drill practice was used to enhance their L2 learning. Drills also served to help students open their mouth to talk, but not to expand students' output. This is based on the textbook, and students are elicited to read more than to express themselves. These models of questions are not real conversations. So students' responses tended to be short.

Songs

Songs can be used as a tool to "lower[ing] the influence of affective filters that interfere with language learning"(Boothe & West 2015) Furthermore, Boothe and West (2015)

suggested that the incorporation of songs in language learning help students be aware of linguistics. Songs can be used in different ways to teach grammar, vocabulary and pronunciation. Students find learning the English language interesting in this manner because they like songs. This was also the case in the English class of the regular school. Let's take the English song used in the sixth grade as an example. Miss Wang asked the students to sing the song 'Fly me to the moon'. They were taught the meanings of phrases like 'in other words' and 'Please be [+adjective]', so they had a better understanding of the song. When Miss Lin asked them to sing this song, students hurried to find out the lyrics and sing it. The words of this song matched the students' English proficiency level. After they finished singing, Miss Lin asked what the words and sentences meant. The lyrics are presented below.

Fly me to the moon
And let me play among the stars
Let me see what spring is like
On Jupiter and Mars
In other words, hold my hand!
In other words, darling, kiss me!

Fill my heart with song
And let me sing forevermore
You are all I long for
All I worship and adore
In other words, please be true!
In other words, I love you!

The lyrics for the English songs always included words or phrases taught in the class. Teachers always first explained the lyrics, and later led the whole class in reading them. After the students were familiar with the lyrics, theteachers played a CD to the whole class, and asked them to sing with the CD. Sometimes, students were asked to stand up to practise the songs with gestures. When students sang with the CD, they seemed to sing happily. This is in accordance with the recommendation that songs are highly effective tools for helping children gain phonological awareness and get motivated in learning the target language (Gillon 2004).

Photo 3-5 Third grade of the regular school

One English song is always included in each unit of the English textbook of the regular school. English songs seemed to play an important role in the teaching procedure there. However, it was found that not every teacher used songs as a tool for teaching English. The teacher who shared songs with students was found not to use them for every unit.

Bilingual School

In the bilingual school, English-speaking teachers were charge of the English language class. These teachers did not use Mandarin Chinese for communicative purposes. With their scant knowledge of spoken and written Mandarin Chinese, EFL instruction here was delivered only in English. This was also confirmed in the interview with the head of administration of the school. This emphasised the significance of the intensive exposure to English in the learning context in Taiwan where English plays the role of a foreign language. The design of the English-only class corresponds to the common belief that being totally immersed in the target language brings the most advantages in acquiring that target language.

The textbook used in the bilingual school was based on stories. In it, each lesson introduced two stories. On the first page of each story, the new vocabulary was listed. There were neither grammar or sentence pattern exercises, nor songs in the textbook. On average, students finished reading two stories within one and a half to two weeks.

The English class in the bilingual school was divided into three parts: homework check, lectures and activities.

Homework Check

Quite different from the regular school, the teachers in the bilingual school started their classes by checking students' homework if they had been assigned any in previous class. Homework checking was done one by one, and corrected in front of the individual student. Most of the students' homework was all correct. Very few showed teachers homework with wrong answers. If so, the teacher would revise the mistakes and explain the answer in greater detail to individual student. This activity took about 10 minutes.

Lectures

After checking the students' homework, the teachers moved on the lesson. In both third and sixth grades, teachers were found to have a brief discussion with students before they went through the story. In the third grade, before the teacher started the new lesson, 'My Trip to Granny's House', he connected the topic to the students' real lives by asking open-ended questions (Extract 12). He tried to elicited simple 'Yes' or 'No' answers first, and then factual answers. This is what Mehan (1979) called 'productive elicitation'.

Extract 12: Third Grade of Bilingual School

Teacher: Do you go to your granny's house often?

Students: Sometimes. Yes.

Teacher: Does anyone want to tell us how to get to your granny's house, by car or by train? Who goes with you? What do you usually do at your granny's house? How many days you stay there? Who will? [Pause] Victor, you like to try?

Victor: I go to my granny's house last week. I go there with my papa and mama and my sister. I play cards. I also went shopping. I stay there for two days.

Teacher: Went, not go. In the past, right? You went to your granny's house last week and you went there with your parents and sister. What did Victor play?

Students [in low voices]: Cards.

Teacher: Yes, Victor played cards [stressing on the *ed* sound to emphasise past tense]. It has happened already, so you need past tense, right. Victor? How did you feel then?

Victor: I was very happy.

Teacher: You were very happy then, but let's find out if the little girl is happy or not.

The teacher corrected Victor's grammatical mistakes directly in front of the whole class and also stressed the use of 'ed' to reminding Victor of the past tense. Finally, Victor used correct past tense, *was*, to reply to teacher's question. Although the questions posed were closed-ended ones except the last one starting with 'how', they were the questions that may occur in real life. The answers from the students may vary according to their own experiences. This teacher used 'follow-up moves' to elicit more response from students in the hope to expand his interaction with them. The dialogues between the teacher and Victor occurred in a communicative way.

This was followed by vocabulary introduction in the third grade. However, the sixth-grade teacher was found not to introduce new words to students first; instead, he went through the story. During this activity, he explained the meanings of words and also gave examples to the students. When he explained the meaning of sentences, he also taught students new words. In Extract 13, the teacher introduced the new vocabulary first before he went through the story.

Extract 13: Third Grade of Bilingual School

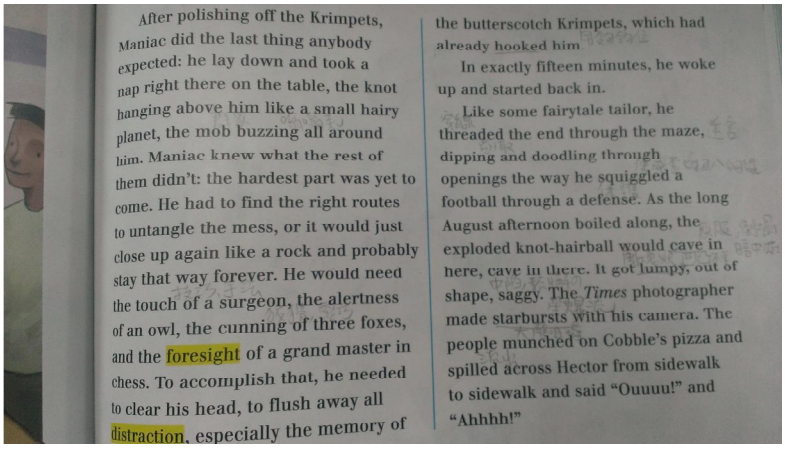
Teacher: Tender. You know tender; tender means very gentle. Probably, talk gently, behave gently. Who you think is tender? Mm, your mom, right? Ok, probably, your mom is not that tender…. But here tender means very soft [writing down 'soft' on the blackboard]. You can say tender chicken [writing down 'tender chicken'], meaning the chicken is very soft, not hard, like tofu. You know tofu, right? Easy to eat, specially for old people. The next one is delighted. Delighted means happy. 'You are very delighted', means you are happy. You are delighted because your parents give you 2,000 NT dollars. Ha ha ha…. I will be very delighted

> if you talk more in class [students laugh]. All right, this word is easy for you. Brittle, brittle means easily broken. Like what? Like our bones, glass. Okay? Next one, embrace. To put your arms around someone, to hold someone, like this, all right? Another word we often use is hug. You like to embrace others? Or your just like to shake hands? [Silence] Clear? Questions?

The third-grade teacher explained the new words very quickly. It only took him about five minutes. He kept asking questions to the whole class, but got no response. This teacher was found to speak too fast. Whenever he asked a question, he just paused a second and continued to talk. This may have resulted in no response from the students. He needed to give students more time to response. He joked when he made a sentence with the new word 'delighted' by saying 'You are delighted because your parents give you 2,000 NT dollars. Ha ha ha.... I will be very delighted if you talk more in class.' This made the students laugh. In addition, the teacher might have given the students more examples to understand how to use new words.

In the English textbooks used, the reading parts were much longer and complicated than those in the textbooks in the regular school. The words marked in yellow in Photo 3-6 were the new words for that lesson, but students looked up other words and wrote down L1 translations. Although Krashen (1982) suggests that L2 input should be slightly above the level of the L2 proficiency of students, L1 translations in words are much more than the new vocabulary listed in the book. This shows that students' vocabularies were poorer than what they are supposed to be. Vocabulary helps oral proficiency, reading comprehension and school achievement (Gathercole, Thomas and Hughes 2008; Tabors, Páez and López 2003). This suggests that vocabulary is key for the use of a language. Krashen's Input Hypothesis suggests that the target language can be slightly beyond the learners' competence in order to be comprehensible for L2 acquisition (Krashen 2000). Otherwise, it may make them frustrated. Students' poor vocabularies indicated their lower English proficiency than what they were expected to have to catch up with the lesson.

Photo 3-6 Textbook with much L1 translation



After polishing off the Krimpets, Maniac did the last thing anybody expected: he lay down and took a nap right there on the table, the knot hanging above him like a small hairy planet, the mob buzzing all around him. Maniac knew what the rest of them didn't: the hardest part was yet to come. He had to find the right routes to untangle the mess, or it would just close up again like a rock and probably stay that way forever. He would need the touch of a surgeon, the alertness of an owl, the cunning of three foxes, and the foresight of a grand master in chess. To accomplish that, he needed to clear his head, to flush away all distraction, especially the memory of the butterscotch Krimpets, which had already hooked him.

In exactly fifteen minutes, he woke up and started back in.

Like some fairytale tailor, he threaded the end through the maze, dipping and doodling through openings the way he squiggled a football through a defense. As the long August afternoon boiled along, the exploded knot-hairball would cave in here, cave in there. It got lumpy, out of shape, saggy. The *Times* photographer made starbursts with his camera. The people munched on Cobble's pizza and spilled across Hector from sidewalk to sidewalk and said "Ouuuu!" and "Ahhhh!"

In the sixth grade, the teacher was found to use drawings as a strategy to attract students' attention. The teacher drew a fish and wrote down 'b_' (for 'bargain'). This method was only found in this teacher's class. These two teachers sounded humorous and easy-going. Such characteristics, such as being friendly, funny and patient, were found to reduce students' language anxiety (Ziv 1988; Senior 2001).

Later, the teacher directed the whole class to read out the story in chorus, or asked students to read several sentences or one paragraph by turn. If students struggled with the pronunciation of words, the teacher would help then and ask all the students to repeat the word after him. After this, the teacher summarised the main plot either himself or by asking students what they had read. After students had a rough idea about what was going on in the story, he went through the story line by line.

Besides explaining the meanings of words and sentences, the teacher also focused on the ideas developed from the story, which did not happen in the regular school. In general, the teachers in the bilingual school focused more on the meaning of the content rather on the forms of the language.

Activities

In the final part of the lesson, the teacher asked questions to help students recall and retell the story, or share their opinions with other students. The teachers always asked open-ended questions to help students think critically and apply their knowledge to real-world situations. Thus, the question types used by English-speaking teachers elicited more meaningful output from students. It was often found that the phrase 'come

on' was used by English-speaking teachers in the bilingual school to encourage students to give an answer (Llinares-Garcia 2005). Extract 15 describes an interaction from the sixth grade.

Extract 15: Sixth Grade of Bilingual School

Teacher: What character do you like the most? Why?

[Students are silent.]

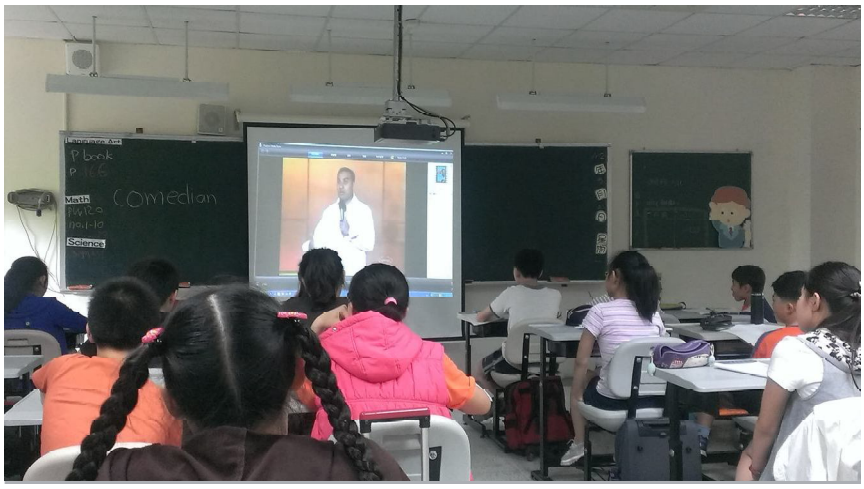
Teacher: Come on. You have read the story. Your have your own opinions, right? Share with us. Angela, would you like to share your ideas with us? Anything, any ideas, as you like. You are 10, 11 years old, you have your own ideas. Come on.

Students: 11, 12.

Angela: I like Philip's grandfather because he is very kind. He likes to help people and animals.

Besides textbooks, in the sixth grade, the teacher was found to use clips from YouTube, which provided students with different sources to learn from. One film was about a comedian's show, but none of the students laughed (Photo 3-7). Their silence might be due to difficulties in following the comedian. Students' English proficiency was lower than expected by the teacher. In terms of learning sources, students of the sixth grade of the bilingual school were provided with more online materials than their counterparts in the regular school.

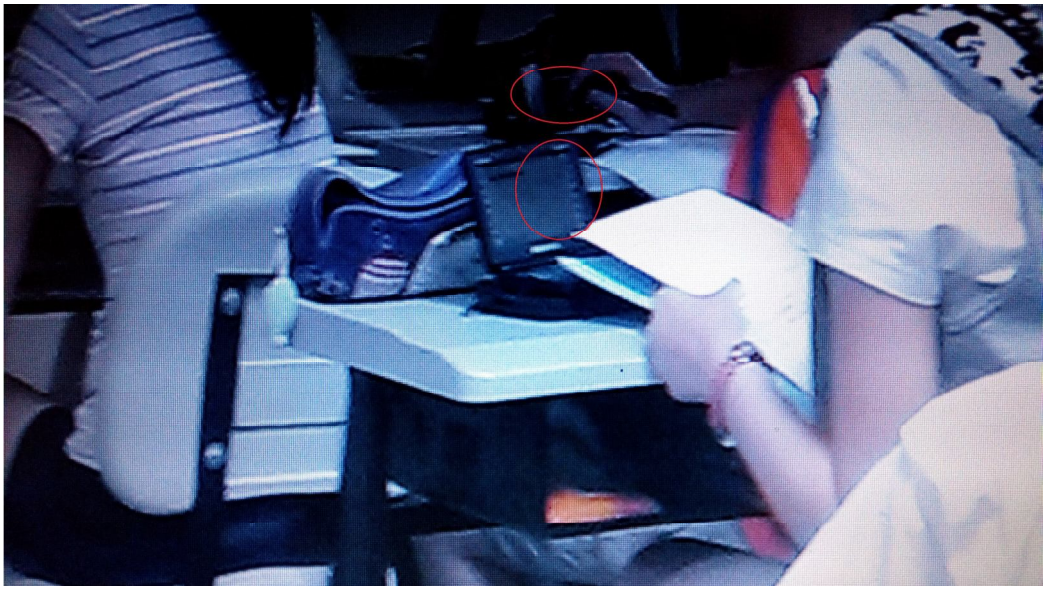
Photo 3-7 Sixth graders of the bilingual school watching a film about a comedian



During classroom observation, one time the teacher led the whole third grade to the library to read. When they entered the library, all the students were told to gather together. They were asked to pick up one English book regardless of the genre, and they had to share the main plot of the books after 20 minutes. Even if they did not finish reading the books, they had to share whatever they had read. According to the teacher, this activity of reading in the library only happened once every month.

Students' silence in the class attracted the researcher's attention, so she checked the textbooks, students' papers and homework. In the bilingual school, both third and sixth graders were found to use e-dictionaries to look up English words for L1 translations in class (Photo 3-8). When they were unable to follow their teachers, they needed L1 to support their understanding of L2. This only occurred in the bilingual school, not in the regular school.

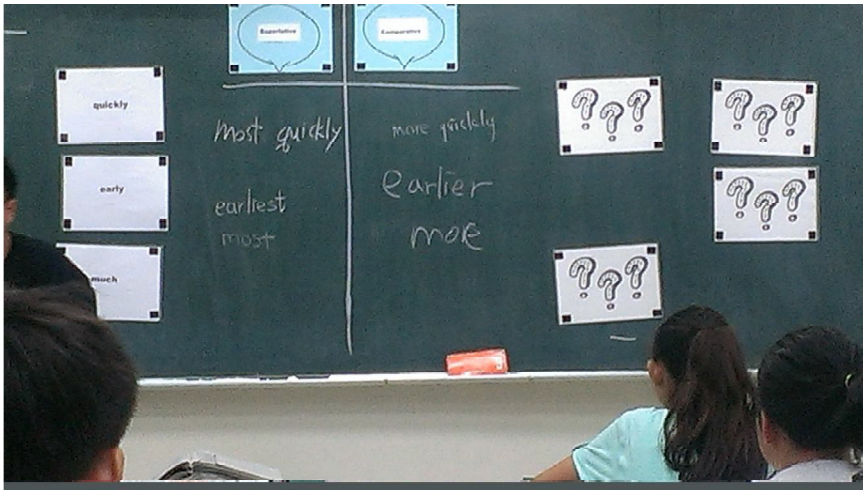
Photo 3-8 Students using e-dictionaries in the English class in the bilingual school



Sometimes, group competitions were also run for third and sixth graders. The teachers usually divided the class into two or more groups. In the sixth grade, the teacher introduced the comparative and superlative forms. One girl was called to select one word from the six stuck to the board. She had to write the superlative form and ask one of her classmates to write the comparative form. However, the students did not show much interest in this activity. The teacher asked students to volunteer, but no one

did. Class time was wasted. This echoes Scarcella and Oxford's (1992) findings that competition activity may raise students' anxiety in a language classroom.

Photo 3-9 A competitive activity in the English class of the sixth grade of the bilingual school.



In the bilingual school, reading was the primary teaching method used in the bilingual school. This included stories, essays and poetry. Teachers tended to go deeper into the knowledge and implications of the content instead of emphasising the forms of sentence. The English class was not only for L2 teaching, but a discussion and appreciation of English literature.

In both schools, the teachers talked much more than the students and students learn through passive listening. However, the students in regular school take more class participations than the counterparts in bilingual school. The bilingual school students take more participations in L1-medium class than in L2-medium class in both graders. These coincided with research on the characteristics of Taiwanese students in classrooms where, as mentioned, a teacher-centred style is dominant (Hadley 2001).

Maths Classes

Teaching in the maths classroom was commonly based on the textbook, which is organised by topic according to the national curriculum. This section seeks to uncover the similarities and differences in the process of teaching mathematics in each type of school.

Regular School

There were mainly two types of mathematical activities in the regular school, taught activities and students' practice. Taught activities were teacher-planned activities that occupied most of the class time. The teachers were found to present the materials on the interactive whiteboard first, and later explain the materials to the students. These activities were carried out through the direct teaching of the whole class according to the teaching plan. After one unit was finished, students were given work to practise either in their textbooks or on the board.

As mentioned earlier, the teachers used the method of direct teaching. They stood in front of the class and used the board to teach. When the class started, the teacher reviewed the contents they had covered in the previous class, calling on either individual students or the whole class to answer questions. This part lasted no more than five minutes. Then the teacher moved on to the new lesson.

When the teacher was teaching a new lesson, they always kept asking questions to make sure if students followed. Sometimes, the whole class gave the answer together, and sometimes a few students who knew the answer did. If no one answered, the teacher would answer themselves and would not force students to answer. In this case, the teacher would explain the answer in more detail. Later, a similar question would be posed and students would be asked to solve it again. Students of both third and sixth grades were found to ask questions if anything was unclear (sixth graders asked more than third graders on average) and the teachers would explain it to them. In general, teachers kept order in their classrooms and students behaved well. For instance, Ms Huang praised students when they gave the right answers. The pictures show that students listened to her explanations carefully.

Sometimes students were asked to be teachers for other classmates. The teacher picked one student from the volunteers to give other students a lesson. Sometimes, the teacher randomly picked someone and asked them if they would like to give it a try. By doing so, all of the students had the chance to be picked, so everyone had to focus on the lesson.

Besides lectures, doing exercises attached to each unit in the textbook is another activity in the class. After the teacher finished teaching one part of the unit, students were always asked to do the exercises, and three to five students would be called to write down their answers on the board. Probably due to the big size of class—40 to 45

in the regular school—there was no group activity in either grade. Although students were not put in pairs or groups, they were encouraged to work with classmates sitting around them. It was found that most students did the assigned exercises alone rather than in pairs or groups. Student–student interactions occurred very rarely in the maths classes in either grade of the regular school. What students did in class included copying notes, underlining important words, and completing worksheets or exercises assigned by the teacher. Student sometimes asked questions for clarifications.

Teacher lectures were the main means to teach students mathematics in the regular school. Direct teaching dominated the process, focusing on what to teach in class based on the textbook. Students learnt passively, directly from what had been planned by the teacher. Doing exercises individually provided little room for cooperative learning. Teacher–student interactions were characterised by the one-way knowledge transfer from teachers to children by means of asking and answering questions. Thus, in the maths class of the regular school, the process of teaching was through knowledge transfer. The teachers seemed more or less to be aware of this problem. However, the large size the classes and limited time available probably explained the absence of other maths activities.

Bilingual School

The bilingual school offered a normal maths course to students since grade one, as well as an English-medium maths course to help those who want to study abroad after elementary school. The students received L1-medium maths instruction first and L2-medium later. They learnt the same content twice taught by a native speaker of Mandarin Chinese and then by an English-speaking teacher. In doing so, students were supposed to gain maths knowledge and learn English terminology used in maths.

L1-Medium Maths Class

In L1-medium maths classes, the activities included lectures and exercises, same as in the regular school. In both third and sixth grade, the teaching process was similar to that in the regular school. The teachers were found to adopt direct teaching for the whole class. They also reviewed what had been learnt in the previous class before moving on a new lesson. They were found to explain clearly to students and to keep asking questions to make sure the students followed the lesson. If teachers asked

questions or needed volunteers, some students responded.

The review of the lesson learnt in the previous class took about five minutes. This helped students not just recall what they had learnt, but also connect it to what they were going to learn. After this, the teacher moved on the new concept for the current class. Although the teachers in L1-medium maths classes of both grades were found to explain the lesson clearly and students usually gave responses, their lectures were shorter than those of their counterparts in the regular school. Instead, they gave more class time to students to do exercises.

As in regular school, students also played the role of teachers in the maths classes of the bilingual school. After the teachers finished teaching one part of the lesson, they would pick one or two volunteers to explain certain questions. However, it was found that the rest of the students did not listen carefully to their classmates. This activity did not work as well as it did in the regular school.

Doing practice exercises in maths was found to be important in the maths classes of both schools. It is obvious that practice is viewed as an important process of maths learning in Taiwan. Student exercises were done in groups in the bilingual school, while students did it individually in the regular school. This is probably due to the difference in class sizes. In the bilingual school, students were usually divided into small groups of four to five each. Each group was given a board and asked to solve a maths questions posed by the teacher. After several minutes, the teacher wanted all groups to show their answers. If a group did not have a correct answer, the teacher would ask how the wrong answer was arrived at. Consequently, there was more room for the teacher–student interactions.

Students were encouraged to have group discussions, which provided each student with an opportunity to participate. However, it was found that some groups were led by one or two students, with the other members chatting about other topics or keeping silent. Some of the students were found to walk about freely in the classroom during the group discussion. Some did not focus on the work at all. The whole class becomes chaotic when students are grouped. Positive student–student interactions were encouraged in small groups. Teachers need to carefully consider how to improve the efficiency of group learning, as improper grouping may not only hinder students from learning, but also create conflicts (Chen and Fong 2000). Obviously, the advantages of group learning did not work efficiently in the bilingual school. The main reason is likely to be that it was not mandatory for students to sit with group members and take part in

the discussions.

Photo 3-10 The boy in the green T-shirt works alone when students are grouped for discussion in the math class of the sixth grade of bilingual school

Similar to the regular school, the teacher's lectures dominated maths teaching in the bilingual school. This was based on the textbook and provided students with a meaningful learning environment. Maths classes in the regular school and L1-medium maths classes of the bilingual school offered two-way interactions through questions and answers between the teachers and students. The formal lessons were directed by teachers in both settings. Different from individual work in the regular school, group discussions supplemented learning in the third grade (but not in the sixth grade) of the bilingual school. However, due to the loose class rules, students were easily distracted, and group discussions did not positively promote student–student interactions.

L2-Medium Maths Class

The students seldom asked any questions in the L2-medium maths classes to clarify their understanding of the mathematical concepts being taught in either grades. The main activities in these classes were lectures and exercises. However, teachers were found to skip the normal explanations and exercises, and ask students to do textbook exercises first. In the L2-medium maths class, teachers were often heard asking, 'What did your Chinese teacher say?' or 'What did you learn from your Chinese teacher?'

Extract 16 is taken from the sixth grade, in a lesson about probability, which showcases how an L2-medium maths class usually progressed. Teacher G first asked students what they had learnt in their L1-medium class about probability, but got no response from the students. He started the lesson by giving them exercises on probability, but without first explaining the concept.

Extract 16: Sixth Grade of Bilingual School

Teacher: Guys, all right today? You know probability, right? Can anyone tell me what you learnt last class, what your Chinese teacher taught you, what you have in your mind about probability? Yeah, probability, you can give us examples or just tell us what you know about probability?

[Students are silent.]

Teacher: Anyone? Any words? Any ideas? I know Taiwanese students are shy. Ok. Let me… okay, now you are going out, have a date with someone, a girl or a boy of your dreams, your best friend, your mom, whoever. You have to dress up, right? You open your closet and find you have different… different clothes…. Okay, you know what I am doing… you know, you have different choices to make you look different…

Photo 3-11 A L2-medium math class of the sixth grade of bilingual school

The teacher wrote down the possible looks for students when they went out on their date (Photo 3-1). He kept asking students what they would wear using various categories like pants, shirts, shoes, hats and socks, but no student responded. After the teacher finished writing on the blackboard, he started explaining what is shown as Extract 17. However, he did not really explain what probability was.

Extract 17: Sixth Grade of Bilingual School

Teacher: Now you have different choices here. Who likes jeans? I like jeans. I wear jeans all the time. Okay, tell me how many choices you have for pants? You can wear jeans, clown, shorts, suspenders. So you have four choices, right? [Writing on the blackboard] How about shirts? How many different kinds of shirts? One, two, three, four, five, so we have five choices. Then shoes, one, two, three, four, five, same here. Hat? One, two, three, four, five. Five again. Socks? One, two, three, four, five. Okay, so you can dress up differently, right, depending on your mood, happy or sad or angry. Okay, so, how many different choices do you have? Four times five times five times five times five, right? So you have 2,500 different looks, right?

The teacher posed many questions to the students, but he did not to ask the questions seriously. He just asked and did not care if there was any response from the students. So he continued with his statement, without any pause. He did not pause because he did not wait for answers from the students. Teachers in L2-medium maths class ignored the importance of students' active response.

Later the teacher continued to ask the class to give him three different looks. There was no response from the students, so three students were called by the teacher to give one possible look each. Given this strictly teacher-centred approach to maths teaching in the English-medium class, the difficulties encountered by the students is predictable given that they are learning in a foreign language that is not necessarily used in their daily lives. Due to their limited English proficiency, the students may find it more difficult to express their ideas freely in class. Accordingly, students were often found to prefer to remain silent and rarely volunteered in class. The questions posed by the teacher can be characterised as a one-way communication, comprising both raising and answering questions. This is in conflict with a student-centred tradition in the

English context. This is probably due to the students' silence in the class, making the teacher change his teaching style.

Moving on with the topic of probability, the teacher held a dice in his hand and asked the class to write down the possible results if he threw the dice twice. Then, he asked how many possible results there would be and asked students to give examples of possible results. For the rest of the class, the students were asked to do exercises in the textbooks individually.

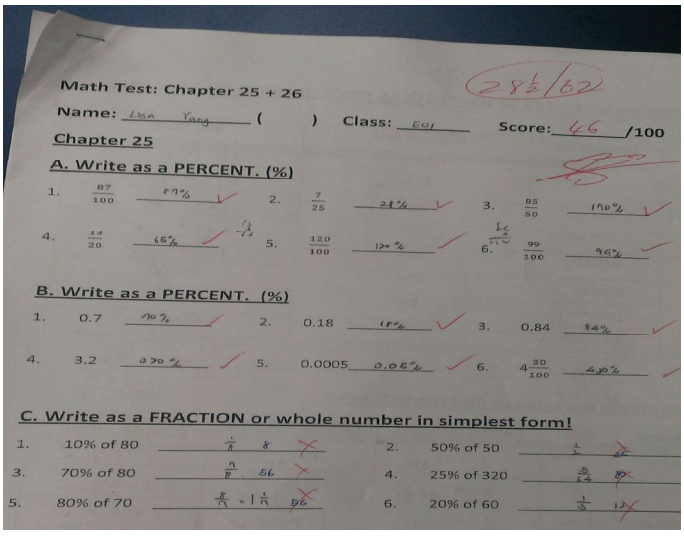
Teacher L in the sixth grade returned students' homework and told them that some of them had not answered the last part correctly (Extract 18).

Extract 18: Sixth Grade of Bilingual School

Teacher: I am so surprised to see most of you did not give the correct answer. A of B means A is one part of B, right? You should have this concept. So, question one asks, 10 per cent. Ten per cent from what? From 80. Fine?

The teacher was found to provide students more exercises rather than teach what probability is. It would have been more effective for the teacher to tell them the right answer instead of guiding English-limited students to express their ideas in English. That is, students were not taught the concepts of mathematics in L2-medium maths class, but they were provided more exercises to practises. The teacher seemed to pass the correct answer to students quickly for revision purposes.

Photo 3-12 L2-medium math test for sixth graders of bilingual school

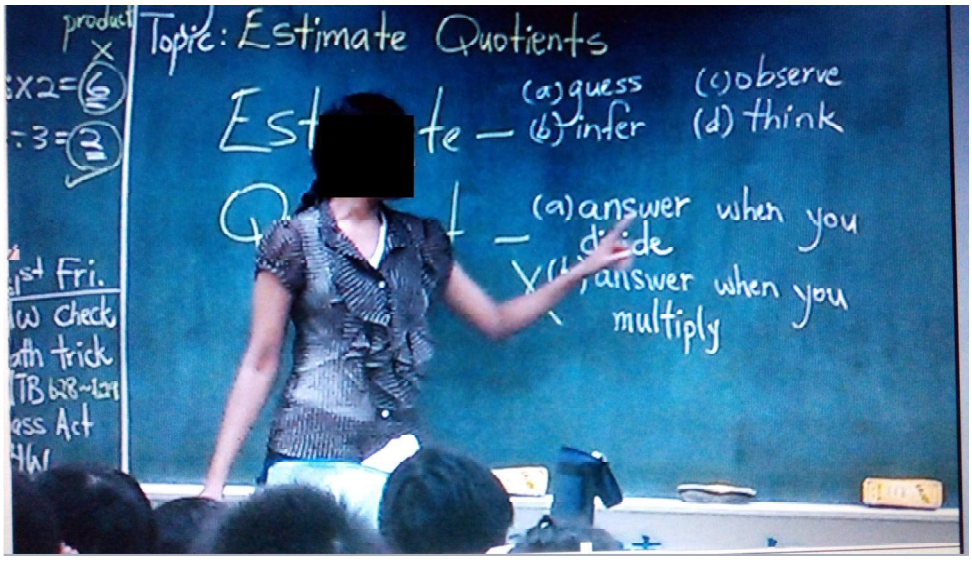


The students were found to always express themselves to their classmates in L1 instead of L2, even in an L2-medium class. In addition, during breaks, students were found to use L1 for informal conversation. However, during the L2-medium maths class, students rarely asked questions or sought clarifications from the teachers. In one L2-medium math class of the 3rd grade of bilingual school, one low voice was heard by the researcher in the class, one student sitting at the back asking his classmate in L1, '*Zai gan ma*?' (What are we doing?) It seems that not all students followed the teacher.

The teachers observed tried to promote more interaction among the class, but their effort was often met with little success. This may be because the students were less likely to speak in the L2-medium classes. Students' silence may be interpreted as an act of unwillingness (Nikula 2005) and may be a reflection of their fear of speaking in L2 (Horwitz, Horwitz & Cope 1986). Again, this was possibly due to their limited L2 proficiency.

The maths class of the third grade started with an introduction of the vocabulary used. Extract 19 is a typical beginning of each unit in her L2-medium maths course. The teacher wrote, 'Topic: Estimate Quotients' on the board and made sure the students got the meaning.

Photo 3-13 the math class for 3rd grade of bilingual school



Extract 19: Third Grade of Bilingual School

Teacher [pointing at the word 'Estimate']: Do you know what this means?

[Some students check their e-dictionaries]

Teacher: It's meaning is similar to guess, observe, infer, think. [Writing down these four words]

Teacher [pointing at 'Quotients']: What are quotients?

[Silence]

Teacher: Which one is correct? [Writing '*a*. answer when you divide' and '*b*. answer when you multiply']

[Silence]

Teacher: Okay, what is quotient in your language?

Students: 商數 ['Quotient' in L1]

When this teacher took up a new unit, she usually introduced and explained the English mathematical terms related to the new lesson by writing them on the board. She was found to use a clearer articulation, slowing the speed of her delivery, and repeating the words several times. In Extract 19, she used the English mathematical term 'quotients' for the first time and the students were not familiar with it yet. They were silent, though some students were found to be busy checking their portable e-dictionaries. It seems that students preferred to be silent and pretended that they followed the teacher, while silently checking the L1 meaning by themselves, rather than honestly telling the teacher that they did not understand the new words. It was not until the teacher asked students to give the meaning in their L1 that she realised that they did not understand the terms she written on the board. So she asked those who had checked the L1 meaning to share translations with the class. It was also found that students tended to ask their peers what the teacher said rather than ask the teachers directly. Students eventually understood the meaning either from their peers or checking their e-dictionaries themselves. After introducing new terms related to the new unit, the teacher applied these terms right away. However, is it possible for students learn the new words and apply them so quickly?

Mathematics vocabulary is very important due to the naming power of the mathematics register (Lee 2006). If students cannot catch the words in the mathematics

register, they tend to fail in ‘making up mathematical concepts’ (ibid.: 17). As found in the maths class of the bilingual school, teachers did not allocate enough time to the instruction of the language of mathematics, as also found in Monroe and Orme’s (2002) study.

In the third grade, after the teacher’s lecture, group discussions were usually held in small groups of four to five students. The teacher posed questions and all the groups had few minutes to figure out the answer. They had to write down their answers and show them to the teachers. Later, the teacher would pick up one student or ask a volunteer to come up in front to show how they got the answer. However, in group discussions, some students had to turn their backs to the teacher, so they weren’t able to see the teacher, which made them easily distracted (Photo 3-14). After this, the teacher asked, ‘Any questions?’, usually getting no response from the students. Then, the teacher would pose another similar question for all the groups again. As mentioned previously, in L2-medium maths classes, the English-speaking teachers spent less time on lectures, but more time for students to do exercises. My observations showed that students of the sixth grade in the bilingual school were not taught the same contents of maths in Mandarin Chinese first and English later, but were led to do more maths exercises in the English-medium class. This is against the goals set by the bilingual school: students learn maths in both languages. This results in students of the bilingual school having a lack of experience with mathematical English. In the L2-medium maths classes, teachers were not found to review what they had taught in the previous class either.

Photo 3-14 the math class for 3rd grade of bilingual school

The major similarity between the two schools was that teachers' lectures dominated the class. Observations showed some other similarities. First, both schools adopted direct teaching of the whole class. In both schools, the main two activities adopted in the class were the teacher's lecture and students' practice. In the regular school, the teacher's lecture occupied the most of the time (approximately 70 per cent), while it was about 60 per cent in L1-medium maths class and 30 per cent in L2-medium one of the bilingual school. The classroom observation also revealed that the maths classes were rather teacher-centred. Lectures are believed to be the most efficient method of delivering knowledge to students (Lemberger et al. 1999). This view is consistent with the students' passive attitudes in taking part in the class. They made little effort to try to respond to the questions posed by their English-speaking teachers even they were supposed to have had some familiarity with the topic.

Classroom Discourse

Classroom discourse among teachers and students, and between students helps understand how teaching and learning are done. This section talks about the way in which English and mathematics classes are conducted in both types of schools in the hope of finding out what affects students' performance. The extracts presented here provide specific examples of these characteristics.

The Language Used by Teachers

The major difference between the two schools is the language used for teaching. In the regular school, the native speaker of Mandarin Chinese in charge of the English class knew both the students' L1 and L2. However, in the bilingual school, all teachers who ran the English-medium classes were not capable of using L1 as a means of communication. English-medium classes in the bilingual school had a mandatory English-only policy. As discussed later in this section, the use of different languages had different outcomes in the two schools.

In the regular school, native Mandarin Chinese speaker run all the classes, including English. Teachers of English were observed to use L1 and L2 to teach English in both the third and sixth grade. They used L1 for pedagogical purposes (Rolin-Ianziti and Brownlie 2002, Rinnvolucri 2001), such as explanations of grammar (Extracts 5, 6) and translations (Extract 7), and L2 for helping students practise sentence patterns that had been taught previously. Teachers interacted with students in L1 most of the time, switching from one language to another based on pedagogical requirements (ibid.). This method can be used to easily check students' comprehension (Levine 2003), to explain difficult concepts, and vocabulary and grammatical explanations (Makulloluwa 2013, Magid, El Mamoun and Mugaddam, 2013), which would save time and confusion (Harbord 1992).

In the bilingual school, the teachers teaching English-medium classes were not capable of using students' L1 as a means of communication, so English was the only language used for teacher–student interactions. Thus, these should be defined as monolingual classes, not bilingual ones. Due to the usage of L2 only, the English-medium classes of the bilingual school presented a very different picture from that of the regular school.

This teacher used some non-verbal signals, such as gestures and tone of voice, to help get their instructions more comprehensively across to students. These signals are important in compensating for the language gap. However, the non-verbal signals seemed to fail to express abstract ideas. Thus, in the English-medium maths classes, communication broke down in some instances. Extract 20 is from the English class of the sixth grade of the bilingual school.

Extract 20: Sixth Grade of the Bilingual School

Teacher: What phrase do you use to refer to frequency?

[Students are silent]

Teacher: You know frequency, right? You want to know how many times a person does a particular thing during a period of time. How do you ask that? How do you get the answer?

[Silence]

Teacher: You know frequency? You can ask... [drawing ' ____ ____' on the board] do you watch a movie?

Students: How often.

Teacher: Bingo. 'How often' is question form to ask about frequency. I know you can find the translation. What is it in your language? [Looking at one girl who is using an e-dictionary]

Student: 频率 ('frequency' in L1).

Teacher: Say it loudly.

[Student repeats]

Teacher: Everybody got it?

Students [in low voice; some nod their heads]: Yes.

The teacher tried to elicit the answer 'how often' from the students, but failed to get his meaning across. This was because the word he used was 'frequency', which was new to the students. When teachers use new words to introduce or explain a new concept, it easily confuses students (Harbord 1992). When the teacher got no response, he adjusted his technique in order to negotiate meaning with the students. Teachers use such techniques to help students understand more about the text and enhance their learning when students have difficulties in following. Furthermore, he noticed someone was checking the e-dictionary, so he asked for the meaning of 'frequency' in the students' L1. He finally got the meaning through using the students' L1, not L2. Sixth-grade students are supposed to be familiar with concepts like 'frequency'. If the explanation is provided in L1, it would be easier to help students know what the English expression 'frequency' means.

In addition, teachers were found to use pictures, gestures, posters and films to help students understand them in English-only classrooms. For example, when new vocabulary was introduced to students, in the case of nouns and actions, pictures and films were found to work effectively. This is line with Cummins' (1981b) views about context-embedded learning environments. A good degree of support in communication, such as body language, hand gestures and head nods, provide visual cues for students to learn L2. However, it remains difficult to convey some abstract concepts by pictures or films.

Such problems also occurred in another English- medium maths class as shown in Extract 19. The teacher wrote 'Topic: Estimate Quotients' on the board and tried to ask if the students understood the meaning, but she failed. She ended up asking students' L1 translation to make English words easy to understand for the whole class.

Another example is provided in Extract 21 from an English-medium maths class in the third grade.

Extract 21: Third Grade of Bilingual School

Teacher: You like watching TV, right? Listen. On Monday you watched TV for two hours, on Tuesday you watched TV for two hours, on Wednesday you watched TV for three hours, on Thursday you watched TV for three hours, on Friday, you didn't have classes next day, so you watched TV for four hours. You went out with your family during weekend, so you did not watch any TV programmes on Saturday and Sunday. How many hours you watch TV every day on an average? [Writing down the numbers 2, 2, 3, 3 and 4 on the board] One minute.

[Students turned to each other and asked what they are supposed to do in L1]

Student: 平均數 ('average out' in L1).

Even though the students had learnt the concept of average already in their L1-medium maths class, they did not know this word in L2. As a result, they did not follow the teacher's instructions. Finally, the students had to use L1 to solve the problem. Therefore, the usage of e-dictionaries by students became a common phenomenon in the English-medium classes.

In addition, teachers were found to use pictures, gestures, posters and films to help students understand them in English-only classrooms. For example, when new vocabulary was introduced to students, in the case of nouns and actions, pictures and films were found to work effectively. This is line with Cummins' (1981) views about context-embedded learning environments. A good degree of support in communication, such as body language, hand gestures and head nods, provide visual cues for students to learn L2. However, it remains difficult to convey some abstract concepts by pictures or films.

In the regular school, teachers in EFL classes used L2 for reviewing learnt phrases and sentence patterns, and a large amount of L1 for grammar explanations, translation and activity instructions. They alternated between the two languages for pedagogical purposes, and as a result, their inputs were more comprehensible to students. Although students were not offered enough inputs in L2 in a communicative way, the use of L1 definitely created a supportive and enjoyable environment for L2 learning. As a consequence, students tended to have a better interaction with teachers and participated more in class.

By contrast, the language used in the English-medium classes in the bilingual school had an L2-only policy, thought to bring about most benefits for L2 learning. Students in the bilingual school thus had a more authentic learning environment for social purposes. However, one cannot ignore the fact that an English-only policy in the bilingual school may have resulted in non-comprehensive input to students and a communication breakdown in the class, which contributed to an unfriendly classroom atmosphere.

The Language Used by Students

A language shift in the students' discourse refers to changes from L1 to L2, or vice versa. This section examines the language shifts by students during L2-medium classes, including English and maths. Following previous discussion that English was treated as a subject in the EFL class of the regular school, it was not surprising that students did not use English as a means of communication. Instead, they were more likely to use L1 to clarify words and concepts. By contrast, in the bilingual school, English was the only language used in classes run by English-speaking teachers, and students had to use it for communicating with teachers. However, it was found that they

tended to use L1 to talk among themselves, particularly in group discussions. This section goes into greater detail about how students of these two schools use L1 and L2 in their classes.

In the regular school, L1 was the language used the most to negotiate with teachers and other students, even in EFL classes. In the observed EFL classes, students seldom used L2 to ask questions. They were found to speak L2 when they were asked by questions in L2 or asked by the teacher to do drill practices. Students were found to rarely initiate questions in L2—though they did answer them—which were mostly to do with grammar-based English. Moreover, they were given questions that elicited short answers only, such as, 'Do you like flowers?' 'How are you today?' 'How many pencils do you have?' and 'What is on your desk?' Most often, these questions had 'yes/no' answers. Students in the EFL classes of the regular school got few opportunities to express their ideas in L2, but they did follow certain patterns. They had less exposure to English since their teachers focused on the grammar translation method. They did not use much English as a natural means of communication. Thus, the students tended to 'talk like a book'.

In contrast, in the bilingual school, L1 and L2 were both used as means of communication in class. However, in the L2-medium classes, L2 was the only language used in interactions between teachers and students, also because the teachers knew very little of the students' L1. L2-speaking teachers offered maximum exposure to L2 to students, and students were, in turn, found to be more capable of expressing their own ideas in L2, and spoke longer sentences than regular school students did. They were also able to use English more communicatively rather than just for drills.

In the L2 classes of the third and sixth grades, lecturing and asking questions occupied the most of the class time. Group discussions were rarely assigned to students in class. However, in L2-medium maths classes of both grades, group discussions were often used as a classroom activity to solve the maths questions. It was surprising to find that students used a mix of L1 (more) and L2 (less) even in the presence of the teacher.

Extract 22 is from one English-medium maths class of the sixth grade. This teacher divided the whole class into several groups and each group was asked to solve three problems in five minutes. Each group had one small section of board to do so. They had to write down the answers on the board and show them to the teacher. Mistakes were made when one boy forgot to carry over.

Extract 22: Sixth Grade of Bilingual School

Student 1: Answer is 302, question number one [pointing at paper].

Student 2: No, you have wrong answer, it is 312.

[Student 1 looks at his paper and murmurs]

Student 1: 302.

Student 2: Show me [turns to look at Student 1's paper]. 這是5, 你沒進位. (This is 5. You forgot to carry over.)

In this L2-medium maths class, students were observed to talk mostly in L1, irrespective of whether the teacher was present. However, in Extract 22, these two students discussed in L2 first and later switched languages when it came to mathematical terms. This seems to suggest that their limited English proficiency hindered them from using only L2 to accurately and successfully express their maths ideas. In this extract, students' use of L1 seemed to be directly related to their proficiency level in English when it came to mathematical terms.

Moreover, they used only L1 to engage in informal conversations during break. No conversation in L2 was found among students at that time. This L1-only phenomenon is common among students of both grades. This also indicated that their language of preference language was L1, which was viewed as the language to be used to easily share their ideas with classmates.

In the regular school, students used L1 to communicate and L2 for drill practice only. They seldom initiated the real conversations in L2. By contrast, as discussed previously, all English-speaking teachers in the bilingual school had very limited proficiency in the students' L1. Thus, English was the only language the students had to ask and answer questions, and for ideas to be clarified by their teachers. When students were stuck, they turned to the e-dictionary to find L1 meanings. However, in L2-medium maths classes, students tended to keep silent unless they were called upon by the teachers. They also used L1 and L2 in L2-medium maths classes for group discussions. In addition, the conversations between students were typically carried out in L1 only during the break. This suggests that in the bilingual school, students' L2 proficiency related to maths was not good enough for them to discuss maths problems in L2, and L1 was the language that they were most familiar with and felt most

comfortable using. Since L2 proficiency was related to participation in L2 classes, it was not surprising to find that bilingual school students tended to be more silent in the L2-medium classrooms than in L1-medium ones.

Culture Barriers

Three significant components contributing to the success of target language are identified by Millrood (1999). They are language, techniques and culture. He examined the Russia context of English learning and found that "culture" plays an impornt role in the success of English teaching and learning. What he referred to culture means "teaching culture or socially expected classroom experience (p.1)" He further suggested that native English speakers are not familiar with students' learning culture, which may result in a gap between teachers and students.

In the bilingual school, English-speaking teachers were in charge of English-medium classes. They had been in Taiwan between 0.5 to 1.8 years, and They were viewed as outsiders to Taiwanese culture. Through classroom observations, it was found that cultural differences were reflected in the interactions among students and teachers. Extract 23 is from the English arts class of the third grade in the bilingual school. The teacher showed students a photograph of Thanksgiving Day using an overhead projector. This photo had a table with a turkey, and various other food and drinks on it.

Extract 23: Third Grade of Bilingual School

Teacher [pointing at the photo]: Are you hungry?
Students [laugh]: Yes.
Teacher: I am hungry, too… ha ha…. You all know this holiday, right?
[Students are silent]
Teacher: You know this, right?
Students [in low voices]: Thanksgiving Day. *Gan en jie* (Thanksgiving Day).
Teacher: What do we call this holiday?
Students [a few low voices]: Thanksgiving Day.
Teacher: You are right…. Whenever your mother buys a turkey and fills some stuff into its belly, like potatoes, carrots, onions, you know the big day is coming,

right?

[Students are silent]

Teacher: Right?

[Silence]

Teacher: Okay, you guys don't want to answer me? All right, today we are going to read a story happening on Thanksgiving night. Are you ready?

[Silence]

Teacher: Page 17… who will read this for us?

[Silence]

Teacher: No volunteer?

Teacher: Okay, Tim, read this for us, okay?

Tim: Where?

Teacher: Here, in this classroom… ha ha… page 17.

This teacher appeared to be very funny. He asked his questions to the whole class instead of calling individuals to answer. To his first question if they were hungry, he got positive responses from the students. He tried to confirm Thanksgiving Day with the students three times in all. His first attempt was met with silence, while the second attempt elicited some low voices saying 'Thanksgiving Day' in both English and Mandarin Chinese. His third attempt was met with 'Thanksgiving Day' in English only. The students who replied in Mandarin Chinese probably did so because they did not know how to say it in English. However, they tried to take part. They stopped replying with the Mandarin Chinese term when the teacher asked the second time probably because they were suddenly aware of this teacher's lack of L1 knowledge. Here, a communication breakdown happened. The students' silence was an ambiguity and it confused the teacher. He responded negatively, saying, 'You guys don't want to answer me.' In fact, generally, Taiwanese students tend to answer passively when questions are addressed to the whole class due to peer pressure in Taiwan culture. They often keep silent. This teacher misinterpreted this silence as he did not know that it happens often in classrooms in Taiwan. In addition, cultures influenced by the Confucius, which teachers are viewed as authority figures in Taiwan, as 'high power distance communities' (Hadley 2001). As a result, students seldom challenge the role of teachers in the classroom. Thus, the misunderstanding caused by the lack of understanding students' culture might result in a communication gap between teachers and students.

In this same class, students were observed to response more actively in other activities, like vocabulary quizzes. Therefore, it is reasonable to assume that the topic of Thanksgiving made them hesitant. Thanksgiving Day is a national holiday celebrated primarily in the United States and Canada as a day of giving thanks for the blessing of the harvest and of the preceding year. The teacher thought that students in Taiwan would be familiar with this holiday. However, only Catholic families celebrate this holiday in Taiwan. In addition, turkey is not popular or easily found in Taiwan. Thus, when this teacher says confidently, 'You all know this holiday, right?' the students were silent since Taiwanese children were taught not to talk back, especially to the elders. Their silence may create the impression of passivity in class and further lead to the conclusion that Taiwanese students are unable to think critically. In addition, traditionally, 'keeping face' is viewed as an important part of Taiwanese culture, so students were afraid to tell the teacher that they did not know this holiday very well.

Another example is cheese. In Taiwan, people seldom eat cheese simply but the cheese-flavoured food, for example, cheese-flavoured cake and cheese-flavoured cookies. However, this English speaking teacher in the math class of bilingual school did not know it.

Extract 24: Third Grade of Bilingual School

Teacher: John, how many people are there in your family?

John: Four.

Teacher: Okay, good number. Here comes the question. If your mother buys one small piece of cheese, a round one, and says, 'John, cut and cheese for us.' You have four people in your family, right.. Then you hold one knife [mimes holding a knife up]. What's the minimum cuts you should do with the cheese?

[John is silent]

Teacher: Come on, John. Your answer?

[Still silent]

Teacher: You know the answer, John.

John: You mean cheesecake? A round one?

Teacher: Not cheesecake, just cheese…. You prefer cheesecake? Okay, let's change it to cheesecake. All right? John, your answer?

[Students laugh]

John: Two

Teacher: Excellent. Show us how you cut this cheesecake [Draws a circle on the board].

Classroom Atmosphere

As both schools in this study were private ones, the quality of teachers was likely to be more strictly controlled compared to government schools. It was found that the native speakers of Mandarin Chinese in the regular school disciplined students more strictly. If students did not obey class rules, they would be punished by being made stand up to listen to the lessons. By contrast, English-speaking teachers seemed to be more friendly and patient towards students. It seems reasonable to assume that the classes conducted by English-speaking teachers were likely to be more active and enjoyable. However, the findings did not support this.

As discussed earlier, teachers in the regular school tended to conduct mechanical drills and teacher-guided interactions, which were found to easily minimise students' language generation abilities and may have further lowered their motivation to learn. However, during class observations, there was no negative impact of the interaction found in the English classes of the regular school. Students mostly took active part in the class in spite of the strict classroom rules set by the teachers.

Teachers in the bilingual school tended to play more games, like quizzes and races. They also gave students more freedom in class, such as allowing them to walk to the dustbins. However, it was found that students of both grades in the bilingual school took part less in class activities than their counterparts in the regular school in L2 classes. Furthermore, the same students were found to be more tense in L2-medium maths classes, particularly in the third grade.

Bilingual school students behaved differently in mathematics classes conducted by the Mandarin Chinese-speaking teacher and the English-speaking teacher. The latter implemented more activities to make students enjoy the lessons compared to teachers in the regular school. Activities in class help promote communication and enjoyment of the subject. However, in many activities, most of the students remained silent if teachers did not call on them. Most of the students' serious facial expressions, and passive attitudes and behaviours seemed to suggest that they did not enjoy L2-medium maths

classes. Their attitudes and non-participation may have resulted from their anxiety mostly due to their low levels of English proficiency and comprehension. In L1-medium maths classes, students were sometimes found to chat with each other, whereas they seldom spoke in the English-medium maths classes. The following extracts are quoted from mathematics classes conducted by the teachers speaking Mandarin Chinese and English. They illustrate the interactions between teachers and students in the third and sixth grades of the bilingual school. Extract 25 illustrates how the teacher responds to the hand-drawing of a face on the textbook of Boy A sitting in the middle of the classroom when the teacher stands by students and monitors their assignment individually.

Extract 25: Third Grade of Bilingual School

Teacher: *Jhe shih ni ma? Jhe bu siang ni, yin wei ni de yan jing mei na me da.* (Is this you? He doesn't look like you because your eyes are not that big.)
[Students laugh loudly]
[Boy B sitting behind Boy A rushes forward and looks at the drawing; the teacher remains there]

Boy B: *Na bu siang ta, na kan ci lai siang nyu sheng.* (That is not him. That looks like a girl.)

Boy A: *Gen ni mei guan si. Zou kai la.* (Nothing to do with you. Go away! [using very vulgar words])
[Students laugh]
[Four boys and two girls rush to Boy A and try to have a look at the drawing]

Boy C: *Na shih bian sing ren.* (It is a transsexual.)

Boy D: *Kong bu o! Kong bu o!* (Horrible! Horrible! [in a funny tone])
[Students laugh]

Teacher: *Huei zuo wei cyu, dao shu san miao*. (Get back to your seats, three-second countdown begins now.)

The teacher was a native speaker of Mandarin Chinese. Obviously, the third-grade students were not afraid of the teacher and continued to tease Boy A when the class was still running. This is against class rules—students are supposed to sit down at their seats

quietly. Obviously, the relationship between this teacher and students were good enough for students to break the rule and say things they are not supposed to in class. There is continual explosion of loud laughter during this class. The class is full of happiness.

Now let us consider Extract 26 in the same classroom but this class conducted by an English speaking teacher who does not know any Mandarin Chinese.

Extract 26: Third Grade of Bilingual School

Teacher: How much water left if you…?

[Students look down when teacher poses this question]

Teacher: You all know the answer. Come on. Be brave.

[Silence]

Teacher: Vivian, you want to try?

Vivian: Five.

Teacher: Excellent.

This example shows that Vivian knows the answer but does not respond till called upon to do so by the teacher. Nikula (2005) has suggested that students' silence may serve as an act of unwillingness. Horwitz, Horwitz and Cope (1986) have also suggested that being afraid to speak in a foreign language may contribute to students' anxiety. Vivian's hesitant reply and flushed face seem to indicate that she is not unable to answer, but she is probably nervous. In addition, insufficient preparation, speaking English with native English speakers, and fear of making mistakes easily make students feel anxious. Students' fear in class may lead to poor achievement

This teacher in the bilingual school was about 50 years old and spoke English slowly with a smile on his face. Although he spoke slowly, students did not actively respond to him. When he asked questions, the majority of the students suddenly looked down at their textbooks. Most of the questions were obviously easy, and students were supposed to know the answers. However, few responded. Sometimes, the teacher tried to cheer the students up, but they still sat seriously, not showing any signs of relaxing. The possible reason may be the distance between this native English teacher and students. In other words, students did not feel comfortable, but were intimidated of the mathematics class conducted in English, a language that they were not familiar with. Therefore, they had to screw up their courage to take this class.

The mathematics class conducted by the English speaker revealed a different picture from the one conducted by the Mandarin Chinese speaker. Compared to the mathematics class conducted in Mandarin Chinese, students talked considerably less in the class conducted in English. Students' faces clearly showed the tension and they usually sat straight. The interaction between teacher and students were less frequent in the English class compared to the class taken by the native speaker of Mandarin Chinese. Even though he sounded nice to the students, his role as a teacher, and his lack of L1 proficiency and knowledge of local culture seemed to have an impact on the quality of teacher–student interactions. The students seemed not to feel as close to him as they did to the native speaker of Mandarin Chinese. Compared with the same class conducted by the English-speaking teacher, the Mandarin Chinese speaker was able to provide a more favourable classroom environment for maths learning.

Teachers' attitudes towards both Mandarin Chinese and English also have a great influence on students. During the classroom observation in the bilingual school, two teachers' treatments of students' use of Mandarin Chinese were extremely different.

Extract 27: Third Grade of Bilingual School (Mandarin Chinese-Speaking Teacher)

[Teacher asks a question in Mandarin Chinese]

Boy [in English]: Nobody knows.

Teacher: Who knows the answer [in English]? Please raise your small, short and lovely hand [in Mandarin Chinese].

[Students laugh]

Extract 28: Third Grade of Bilingual School (English-speaking teacher)

Teacher: Excuse me… are you speaking Mandarin Chinese? Come on.

Student: …..(in a very low voice)

Teacher: No Chinese… English only. You can do it… try it. I am sure you can answer me in English.

Student: …..(in a very low voice)

Extract 27 shows how the Mandarin Chinese speaker treated students' use of English in the mathematics class conducted in Mandarin Chinese. In this class, students

were supposed to express themselves in Mandarin Chinese. However, when a student responded in English, it was completely accepted by the teacher. Even more, the local teacher changed to English to makes fun of the students. The local teacher responded with mixed languages (L1 and L2). In this class, the use of English was accepted. However, Extract 28 shows a very different picture. In the English-medium maths class, students' use of Mandarin Chinese was rejected by the teacher, who is a native English speaker, because of his limited understanding of Mandarin Chinese.

The goal of the bilingual classroom is to have students become additive bilinguals. However, teachers of Mandarin Chinese seemed to respect students' use of English in Mandarin Chinese-speaking mathematics classes, whereas English-speaking teachers insisted on an English-only policy. This easily resulted in tension between the teacher and students. This teacher refused to let students use their native language. In the bilingual school, students had half of their instruction in their mother tongue, but this language was rejected by the teacher. Ruiz (1984) claims that 'language is a right'. Rejection of one's mother tongue means denying one's identity and self-esteem (Baker 1988). This also happens to immigrant children, who feel shameful about their language and culture when they are forbidden to speak their mother tongue in school (Mohanty and Perregaux 1997).

Extract 28 illustrates how a student tried to respond to the teacher in English but failed because of low English proficiency. Again, the student tried to respond in Mandarin Chinese, but his utterances were rejected by the teacher. Due to the students' limited English proficiency, they had to either use Mandarin Chinese to express what they thought or be silent. They always faced a challenge when speaking in class. If this English-speaking teacher understood students' L1, meaningful interaction would have gone on. Students' language level is strongly correlated with their desire to communicate (Xu 2006). Thus, teachers should modify their speech according to their students' English levels in the classroom.

A positive environment was observed in the L2 classroom of the regular school where the students were more engaged in class discussions and activities than their counterparts of bilingual school. It was found that the frequency of teacher–student interaction was higher in the regular school than in the bilingual school. Moreover, in the bilingual school, interactions in L1-medium maths seemed more frequent than in L2-medium maths classes. These two findings are in line with Lin's (2011) results. Lin confirmed that the medium of instruction and students' level of English proficiency

affected their classroom participation in Taiwan.

In addition, it was interesting to see that students were found to participate more actively in English classes than in English-medium maths classes. Students sometimes actively responded to teachers in English classes, but they seldom volunteered in the English-medium math classes. They were mostly found to remain silent unless they were named to answer a question. Another interesting point was that students were found to talk more and participate more in L1-medium maths classes than in L2-medium maths classes. Accordingly, the use of both L1 and L2 in L2-medium math classes seems to suggest that students could not express certain concepts of maths in L2 well at both third- and sixth-grade levels. This reflected their poor L2 proficiency, which might have resulted in their difficulties in catching up with maths in L2 and their passivity in class.

In English classes of the regular school, students tended to ask more questions than their counterparts in the bilingual school. Although students in the regular school initiated their conversations in L1, they had their confusions cleared up up and got more help from teachers. By contrast, bilingually-schooled students rarely initiated conversations and seldom asked the teacher questions, asked for the teacher's help, or initiated or expressed their opinions on the lesson. This implies that the interactions in the bilingual school may not have been as good as those in the regular school. In addition, Teachers in regular school were found to use some strategies to grab students' attention. They alerted students to pay attention by speaking loudly and slowly, saying things like, '全部看我,等一下要考你們喔 (Class, look at me. I will give you a quiz later),' or calling out absentminded students' names directly. This was often the case in the third grade. Teachers in regular school seem to know how to manage the class and attract students' attention.

Even when sticking to an L2-only policy, teachers in charge of L2-medium classes need to obtain some knowledge of the learners' L1 and culture. Asian students tend to be passive and shy in classes compared to those in Western countries. Thus, the classroom atmosphere and teaching strategies should not be the same. Communication breakdowns and misunderstandings may occur in the classes conducted by non-L1-speaking teachers. For English-speaking teachers, the understanding of learners' L1 and cultural background would be greatly beneficial for L2 teaching effectiveness.

Chapter 4 Discussion

This study examines whether bilingual education helps students achieve better linguistic proficiency and mathematics skills in Taiwan. Students in the grade three and grade six L1-L2 bilingual programme, and their counterparts in a regular school where L1 is used as the medium of instruction and L2 is treated as a subject were compared on measures of L1, L2 and maths achievement.

The first part of Chapter 3 attempts to statistically compare the differences in performance between four groups. Given the fact that the educational context of the bilingual programme is supposed to be different, Chavez and Amselle (1997) have argued that the findings cannot be conclusive without classroom experiences being studied. In addition, exposure to a language is not sufficient to encourage language development by itself. Quality teacher–student interactions are crucial to improve educational outcomes (Kagan 1986). Accordingly, the second part of Chapter 3 discusses the observed classrooms, which were primary sources for this study. This chapter highlights and discusses the main findings and trends that emerge from the data. It also discusses their influence on students' language and mathematics learning from the perspectives of input, interaction hypothesis and sociocultural theory of learning. The results of this study confirm some of the trends identified in the literature, such as the strong relationship between L1 and L2. The findings raise some critical questions about efficacy of the bilingual schools in Taiwan in enhancing learning of L1, L2 and mathematics.

4.1 Discussion of Hypothesis 1

Hypothesis 1: There will be a positive relation between Mandarin Chinese (L1) proficiency and English (L2) proficiency.

The results of this study show that L1 and L2 proficiency are positively correlated and highly significant at 1 per cent significance in both the regular and bilingual school studied (regular school: 0.915; bilingual school: 0.857). This finding echoes some

previous empirical research, such as the relationship between English and French (Deacon, Wade-Woolley and Kirby 2007; Genesee 1979), Japanese and English (Carson et al. 1990), Spanish and English (August, Calderón and Carlo 2002; Ramirez et al. 2010), and English and Hebrew (Bourassa, Treiman and Kessler 2006). These studies focused on orthographic knowledge, phonemic segmentation and word-reading skills between the two languages. Much of the discussion has suggested the contribution of first-language cognitive skills to a second language, as Cummins (1979, 1983) proposed in the Linguistic Interdependence Hypothesis, which refers to 'the incorporation of features of the L1 into the knowledge system of the L2 which the learner is trying to build' (Ellis 1994: 28).

In the present study, L1 and L2 belong to different language systems. The former belongs to a hieroglyph writing system and the later to an alphabetic system. They are distinct in grammar and morphology as well. Through classroom observations, students made more oral mistakes in L2 in the bilingual school than in the regular school. It was found that students growing up in an L1-dominated home and society turned to L1 for guidance when they learned L2. This transfer phenomenon from L1 to L2 was found to be influenced by their linguistic knowledge of the former.

Students' oral errors in L2 were grouped into the following types:

1. *Verb* inconsistent with *time*: e.g., I go to church tomorrow.
2. *Subject* inconsistent with *verb*: e.g., She make me happy.
3. *Comparative form*: e.g., more small.
4. *Unaccountable nouns*: e.g., many work.

These types of mistakes were often heard in the classroom. The concept of time in English is conveyed through changes in the verb, while this is not the case in Mandarin Chinese, where it is done with the help of the adverb referring to time. In addition, Mandarin Chinese neither has an auxiliary verb nor singular/plural forms in verbs. Thus, it is understandable that students made grammatical mistakes while distinguishing verb tenses in English. Besides, Mandarin Chinese does not change the adjective to the comparative form, but puts an adverb in front of adjective. Thus, 'more small' is exactly as translated from Mandarin Chinese. Moreover, it does not have accountable or unaccountable nouns, which accounts for a phrase like 'many work'. All of this confirms students' L2 learning being influenced by L1 and suggests the transfer of skills

between L1 and L2. This is in line with Cummins' (1979), Krashen's (1981) and Panda (2012) findings that the development of L1 facilitates literacy outcomes in a second/foreign language.

In the present study, the transfer of language skills from L1 was found to result in errors in L2. This is called "negative transfer or interference occurs" (Bardovi-Harlig and Sprouse 2017, p. 1) How long does such negative transfer remain? According to Cummins (1979), once students reach the higher threshold, they are relatively balanced and proficient in both languages. If Cummins' hypothesis is correct, errors in L2 show that students from both the regular school and bilingual school have not achieved proficiency in L2. In other words, sixth graders of both schools were not yet balanced bilinguals, showing signs of the difficulties resulting from the negative transfer of L1.

Classroom observation showed that, in the bilingual school, L2-speaking teachers' lack knowledge of the students' L1 could be one of the reasons resulting in more oral mistakes in L2 than their counterparts in the regular school. L2-speaking teachers in the bilingual school knew nothing or very little about students' L1. Therefore, these teachers were unable to instruct students in the differences between the two languages. On the other hand, teachers in the regular school were all local and native speakers of Mandarin Chinese, having had the same experiences of L2 learning as their students did. It was often heard that regular school students were reminded by their local teachers of the possible mistakes they might make in L2. In addition, local teachers used L1 to explain grammar and sentence structures. This kind of L1-supportive L2 learning, along with similar experiences of teachers tended to help students clarify their concepts and learn usage rules of L2, contributing to their accuracy in L2. To help learners be aware of the gaps between their language and target language may help them reach better language learning results (Swain 1985). Similar findings are also suggested by Medgyes (1992), that non-native teachers shared the same learning background with students have their strengths in L2 teaching.

Although the results of the present study confirmed the hypothesis, it yielded a surprise: that is, discrepancies in language proficiencies. Regular school students had a higher mean score of L1 than L2, whereas the bilingual school students scored higher in L2 than L1. Because L2 is treated as a foreign language in Taiwan, it was unexpected for third and sixth graders in the bilingual school to have better scores in L2 than L1, given that the number of classes devoted to both the languages was equal and all students came from L1-speaking homes. Garcia (2009) suggests that the languages used

by bilinguals or multilinguals are hardly socially equal because the languages have varied power and prestige, and they function more or less in different contexts. In other words, their proficiencies in L1 or L2 could vary. Wong Fillmore (1991) suggests that students' motivation in L2 learning can be explained with reference to the societal context in which they are learning it. Since all participants in this study were native Taiwanese, Mandarin Chinese was not only their mother tongue, but also a language presented in virtually all social domains. Thus, it is reasonable to assume that the main factor contributing to the bilingual school students' higher L2 but lower L1 proficiency would be the school. Accordingly, in the bilingual school, where more L2-learning-oriented strategies were followed and a better motivational climate provided to students since the first grade, it is possible these could be contributing significantly to their lower L1 but higher L2 proficiency despite the former being used more in their homes.

Asymmetry of Bilingual Environments

As is evident from the results in Chapter 3 (see the observed classroom settings: Print Rich Environment), printed materials, signs and bulletin boards of students' work in the bilingual school were mostly in L2 than in L1. This might have been due to the higher status of English.

In the bilingual school, much of the wall space in the classroom was devoted to students' individual work in L2. In addition, there were many posters of L2 words and their usage on classroom walls. Such displays were not just found inside the classroom but outside as well. At the time of the study, the bilingual school was running a programme called 'Festival of Foreign Cultures'. Much of the wall space outside the classroom was devoted to different cultures where English was primarily used to convey details. In the school campus, rules, reading materials and directions were mostly in L2, and very few were bilingual. The materials found in Mandarin Chinese (L1) were mostly to do with health warnings (for example, 'Ways to Prevent Avian Flu'), whereas as all the academic and general rules were in L2. In addition, the bilingual school was found to have an abundance—up to 80 per cent of the material—of English books, magazines, newspapers, English TV programmes, English movies and English songs. The language ecology of the bilingual school in the print media was dominated by the L2 language. Thus, bilingual school students clearly had more chance of immersing

themselves in L2 environments than L1, resulting in better English learning compared to Mandarin Chinese.

This is supported by Cetin and Flamand's (2012) views on EFL (English as a Foreign Language) posters in L2 classroom. They suggest that such posters facilitate L2 vocabulary, and their pedagogical effectiveness remains even when the students are not directed explicitly by their teacher to pay attention to English vocabulary. The use of visual aids can be seen as a supportive and contextualising function (McLeod 2007; Snyder and Colon 1988).). The idea of using visual learning aids is built upon the assumption that a visual stimulus can both draw interest and attention, as well as assist with memory (McLeod 2007). The bilingual school also held many contests each term and most of them were L2 related, such as speech contests, spelling bees, vocabulary tests and story making. However, as far L1 was concerned, there were only two competitions, speech and composition, held once each school term.

Although the bilingual school arranged 50:50 of instruction time in L1 and L2, the emphasis on L2 learning was much greater. This may result in students focusing more on the L2 curriculum as it is perceived to be more important. Accordingly, bilingual school students seemed to show more interest and attention to L2 than L1.

Language Hierarchy

The classroom is a site of cultural socialisation where students learn about themselves and their world (Dexter et al. 2016). Research has shown that teacher attitudes carry a message to students whether their L1 and culture are valued or not, which significantly influences students' attitudes towards learning (Ball and Lardner 1997). In addition to the asymmetry of bilingual environments discussed earlier, a likely explanation of the bilingual school students' higher L2 proficiency could be the teachers' extremely varied treatments of students' use of L1. This may influence students' motivation towards L1 and L2 learning, and valuing L2 over L1.

As discussed in Extract 21 in Chapter 3, in one of the mathematics classes conducted by a native speaker of Mandarin Chinese in the bilingual school, the students were expected to express themselves in L1. However, when a student responded to the local teacher in L2, the teacher not only allowed that, he also switched over to L2 himself. In this L1-medium class, the use of L2 was accepted, whereas an L2-speaking teacher would have insisted on a policy of 'English only'. This reflected the relative

status of L1 and L2 within the classroom. In addition, the language used among L1- and L2-speaking teachers was always L2. This seemed to imply that L2 is the majority language in the bilingual school.

In the bilingual school, the sociolinguistic environment clearly favoured L2 despite that the goal of the school being to cultivate students to be balanced bilinguals. This creates a language hierarchy and linguistic ideologies by valuing L2 over L1. Despite not being the language of the society, L2 remains a 'high-status' language and, thus, the power of L2 is reinforced. Teachers also reinforced the power of L2 in the classroom through micro-level discourse and the school did the same at the macro level by having more L2 competitions and more L2-learning-oriented environments. These school-level factors that explain the language ecology may result in a situation where students' motivations towards learning L2 are more favourable than towards learning L1. With its emphasis on L2 learning, the school builds a strong motivational foundation for the promotion of L2 language and context.

4.2 Discussion of Hypotheses 2 and 3

Hypothesis 2: Students from the regular school will demonstrate significantly better proficiency in Mandarin Chinese (LI) than those from the bilingual school.

Hypothesis 3: Students from the regular school will demonstrate worse proficiency in English (L2) compared to those from the bilingual school.

The results confirm Hypothesis 2 (F=11.271 [p=0.001]), but not Hypothesis 3 (F=1.537 [p=0.216]). The F value of 1.537 (p=0.216) is insignificant and suggests that the slightly higher English score in the bilingual school compared to the regular school does not attract any statistical importance. The results show that students from the regular school performed better in L1, but had similar results in L2 as compared to their counterparts from the bilingual school, which does not corroborate previous findings about the positive effects of bilingual programmes (for example, Cummins and Carson 1997; Li et al. 2012; Swain and Lapkin 1982). However, results similar to the ones in the current study have also been found in the work of Carlisle and Beeman (2000). In a classroom with Spanish as the main language, they found that Spanish–English

bilingually-schooled students of grade one performed worse in Spanish reading than those in a Spanish-based school. The findings of the current study too indicate that the bilingual school does not help students achieve additive bilingualism, and to make it worse that bilingual school students did not overcome the lower threshold due to their both underdeveloped languages, which may lead to negative effects on cognition as suggested by Cummins (1979, 1980).

The L1-based curriculum offered by the regular school contributed to a better development in L1 compared to the bilingual school. In the present study, contextual factors, such as more visual aids in L2, more L2 contests, preponderance of L2 contexts in the school, teachers' attitudes and curriculum bias, all illustrated previously in Hypothesis 1, could possibly explain bilingual programmes' observed lack of effects on the students' L1 proficiency. And this is the case even when L1 is mainly used in their homes and outside the L2-medium classes of the bilingual school.

Additionally, it needs to be noted that the bilingual school students had a slower growth rate in mean scores of L1 from the third (16.75) to the sixth (16.96) grade, which was not so in the case of the students in the regular school (where the mean scores were 19.07, and 20.04 respectively). Thus, the bilingual school students not only performed worse in L1, but also demonstrated a slower growth in it compared to their counterparts in the regular school. This seems to echo Cummins' (1979) arguments that if children's L1 skills are less well-developed, a greater exposure of L2 in the very early grades is likely to hinder their L1 development. The bilingual school in this study aimed to maintain its students' L1 while also simultaneously exposing them to more L2 input from the first grade to enhance their L2 learning, which was contradictory to the findings. The results obtained from the study show that the more L2 instruction students receive, the worse their academic achievement in L1.

Some may argue that children in the early grades have well-developed L1 because of their fluent conversational skills in the language. However, conversational fluency does not equal academic language fluency—Cummins (2008) called them 'interpersonal communicative skills' (BICS) and 'cognitive academic language proficiency' (CALP) respectively. CALP skills are suggested to be necessary for success in school (Cummins 1980). When children in early grades demonstrate fluent oral skills, it does not mean that they have enough academic language proficiency to deal with 'the social context of schooling' (Cummins 2008, p.72). Accordingly, children may be mistakenly assumed to have developed full competence in the academic dimensions of L1. Based on this view,

in spite of oral fluency in L1, bilingual school students' academic language proficiency in L1 may still be underdeveloped in the early grades, which may result in their difficulties in catching up academically.

In terms of L2 growth, although the differences in L2 between the third and sixth grades were insignificant (F=0.327 [p=0.568]), despite starting with lower English scores in the third grade, regular school students had a faster growth rate in the mean scores of L2 from the third (18.49) to the sixth (19.27) grade compared to the bilingual school students (third grade: 19.78; sixth grade: 19.86). Regular school students may possibly go on to perform better in L2 than their counterparts in the bilingual school after the sixth grade. This finding is unexpected, since students in the bilingual school have received double the amount of L2-medium classes. This seems to echo what Kagan (1986) suggests, that a great exposure to English cannot guarantee students' language development. The most surprising finding was that the bilingual school students presented similar L2 proficiency in spite of greater exposure to L2 (e.g. Masgoret and Garner 2000), L2-immersed classes (e.g. Genesee 2008; Genesee and Lindholm-Leary 2013), and much smaller class sizes (e.g. Nye, Hedges and Konstantopoulos, 2002), which are deemed to be highly valued in L2-learning environments. However, the beneficial effects may vary based on the type of exposure and the amount of exposure (Leow 1998).

As per classroom observations, the lack of teacher–student interactions in the bilingual school may have resulted in students' unexpected L2 performance. As Canale and Swain (1980) claim, students' communicative competence is developed through the negotiation of meaning. In other words, if students seldom or never participate in class, they don't have a chance of going through the negotiation of meaning, and, thus, their L2 doesn't develop. More details in class participation will be discussed in Hypothesis 7.

By examining the success of bilingual education in other studies (e.g. Pacific Policy Research Center 2010; Swain and Lapkin 1982), the status of the target language in the social context may be one of the significant dissimilarities found to bring about different outcomes in L2 language learning. In Taiwan, before receiving formal schooling, children have very limited knowledge of English. They are unbalanced L1 and L2 speakers, but the bilingual school under this study promotes two languages learning through balanced and separate lessons starting from an early grade. This early exposure to L2-only instruction (English-speaking teachers with a very limited

knowledge in students' L1 and its culture) was found to result in difficulties in catching up with their preschooling L1 experiences . The similar finding was also found in Carlson and Pollard-Durodola's study (2007). Accordingly, L1 is regarded as the most significant resource that students in early grades develop (Wei 1993), also as a tool to reduce their anxiety and help them learn better in L2 (Auerbach 1993; Krashen 1982). Some researchers support the separation of languages for instruction (Baker and de Kanter 1981; Howard and Christian 2002; Swain 1983). According to Howard and Christian (2002), the separation of languages not only refers to the print in the classroom, such as posters and materials, but also refers to student output, which means that students need to do their best to apply the medium of instruction of language. This model forces learners to develop skills in their target language (Howard and Christian 2002). However, it should be noted that the setting for the target language is as a second language, not a foreign language outside school, as English is in the Taiwan context. If the target language is a second language in the social context, it can be reasonably assumed that students in such a setting will have acquired L1 and L2 to some extent before formal schooling begins. This sheds light on why L2-only teaching in Taiwan's context, especially for early graders, may not be able to deliver the advantages reported in other bilingual contexts on students' L2 language development.

According to classroom observations, another likely explanation for similar L2 proficiency presented by the bilingual school students and their counterparts from the regular school in the present study was the use of 'comprehensible input' (Krashen 1981) in the L2 classroom of the regular school. In it, L2 was found to be taught through L1 translation, which is viewed as a valued skill (Horasan, 2014;Levine 2003; Simon 2001; Makulloluwa 2013, Magid, El Mamoun and Mugaddam, 2013), and has been illustrated in Extract 5, 6 and 7 in Chapter 3. The teachers were found to explain vocabulary, grammar and sentences mostly in L1. They also used L2 to ask questions to elicit students' L2 response. In this setting, the switch between L1 and L2 was found to be based on pedagogical reasons (Simon 2001, Makulloluwa 2013, Magid, El Mamoun and Mugaddam 2013). L1 was developed 'as a communication bridge and as a problem-solving tool' (Lantolf 2006). It was a useful medium to foster L2 learning at the beginner levels (Horasan 2014) and easily attracted students' attention (Moore 2002).

By contrast, L2-medium classes in the bilingual school were totally L2-immersed, without any code switching with the students' L1. All L2-speaking teachers in this

school had very little knowledge of the students' L1. The only language they ran classes was in L2. As illustrated in Chapter 3, in both third and sixth grades, students were often found to use e-dictionaries in L2-immersed classes, English and L2-medium maths classes (Photo 3-9). In addition, L1 translations were found everywhere in students' textbooks (Photo 3-6). This suggests that students did not follow teachers in L2-immersed classes and they needed L1 translations to understand the content. Moreover, there were some misunderstandings between the L2-speaking teachers and local students in L2-immersed classes, which led to communication breakdowns and made students embarrassed, as shown in Extract 23. Besides, students' silence to the L2-speaking teachers' queries of 'You follow? Do you understand?' confused the teacher as to whether the lessons stuck with the students or not. These undesirable conditions resulted in the difficulties encountered by the students in an L2-only class. After having investigated the research supporting the advantages of L2-immersed programmes, it was found that there was an absence of the introduction of backgrounds on teachers' languages. It did not mention whether those who conducted in L2-medium classes had a knowledge of learners' L1 and cultures (eg. Genesee and Lindholm-Leary, 2013). Accordingly, it is needed to indicate if the teachers in L2-immersed class know or do not students' L1, which may cause different outcomes.

It must be noted that English (L2) scores mentioned in this study do not reflect on students' overall L2 proficiency, especially bilingual school students' oral proficiency. That is, there might be a possible mismatch between the proficiency tests used in this study and the nature of proficiency targeted by the bilingual school. In L2 classes of the bilingual school, teachers tended to help students with literature appreciation and focused more on meanings rather than linguistic forms. Besides, students were trained to answer to open-ended questions in L2 and this may have helped them develop oral skills. Accordingly, the bilingual school students' spoken L2 may have been more developed, while this may not have been the case for their literacy in the same language. On the other hand, the pedagogy in the L2 class of the regular school emphasised accuracy in a grammar–translation approach. Thus, the language test used in the present study could not show bilingual school students' oral proficiency in L2.

The bilingual school students performed worse in L1 and the same in L2 compared to their counterparts from the regular school. This suggests that bilingual school students' two languages were not developed enough. In other words, they did not overcome the higher threshold suggested by Cummins (1979). Moreover, the bilingual

school did not successfully reach their goal to cultivate to what Lambert (1975) has termed 'additive bilinguals' or "additive bilingualism" by Cummins, which refers to learning L2 within a social context that also maintains L1. This may result from an English-only policy for first graders whose English is very limited. In such a context, where English is a foreign language, the disadvantages caused by an English-only policy outweight the advantages of the traditional myths that largely and totally L2-immersed class, L2-speaking teachers and smaller class sizes lead to better performance in L2.

4.3 Discussion of Hypotheses 4, 5 and 6

Hypothesis 4: There will be a significant positive relationship between Mandarin Chinese proficiency (L1) and mathematics.

Hypothesis 5: Children from the bilingual school will perform better in mathematics than their regular school counterparts.

Hypothesis 6: Bilingual school students perform worse in mathematics taught in English (L2) than in Mandarin Chinese (L1).

The results of this study confirmed Hypotheses 4 and 6, but not Hypothesis 5. According to the data presented in Chapter 3, the linear correlation clearly indicates that L1 was highly correlated with the mathematics (L1 version) performance both in the case of the regular school (0.857) and the bilingual school (0.841). Several studies have confirmed that students' maths achievement is based on adequately developed L1 skills (Clarkson and Galbraith 1992; Cocking and Chipman 1988; Dawe 1983; MacGregor and Price 1999; Secada 1992). In terms of Hypothesis 5, the simple main effects analysis showed that the regular school had higher score in mathematics in Mandarin Chinese than bilingual schools with an F value of 2.838, which is moderately significant though at 10% level ($p = 0.093$). The results of this study show that bilingual school students with extra L2-medium maths class did not outperform their peers of the regular school in the subject. This challenges the generality of the previous findings of positive effects of bilingual programmes (e.g. Admiraal, Westhoff and De Bot 2006), which may be due to the possible cognitive development from bilingualism (Baker 1988, 2006; Cummins 1979, 1981). This also challenges the likely benefits of content-based instruction, which may bring about academic growth while developing language

proficiency (also see Snow 1998; Stoller 2004). Thus, Hypothesis 6 is confirmed. The data here shows that the bilingual school students performed better in mathematics taught in L1 than in L2. The mean difference in scores of third and sixth grade, and the school as a whole, has a *t* value of 10.7, 7.3 and 12.4 respectively, which are highly significant at 1 per cent.

By examining the questions on maths tests, it was found that the results of the tests also corresponded to Hypothesis 4, that L1 and maths are closely related. One maths test (L1 version) question for the third grade is presented here:

Question 1: 41 + 38 + 24= ?

This question is designed to test students' comprehension of the mathematical symbols + and =, and their addition capability. It was found that in the bilingual school, 5 out of 82 students did not give a correct answer in L1, whereas 4 students did not reply correctly in L2. One student did answer correctly in English, but not in Mandarin Chinese. This was probably due to a calculation mistake. In the regular school, there were 4 students who answered wrong. Both groups performed similarly with regard to the question:

Question 2: 小華用30公分的尺量書桌，尺不夠長，量了一次後，再量一次是12公分，請 問桌子有多長？(Mark uses a 30 cm ruler to measure a table. The ruler is not long enough, so Mark uses the ruler a second time to measure the rest of the table, and finds the rest of the table is 14 cm. What is the whole length of the table?)

The difference between Questions 1 and 2 is that the latter requires students to solve an arithmetic word problem. This, in turn, requires text comprehension as well as mathematical operation. First, students need to translate the words into mathematical symbols. Second, they need to do calculation correctly (Briar and Larkin 1984). It is found that 14 and 17 out of 82 bilingual school students did not give the correct answer in L1 and L2 respectively, whereas 7 out of 76 students in the regular school did not reply correctly in L1. Students in the bilingual school performed worse in Question 2 than Question 1, whereas their counterparts performed more or less the same. As discussed previously, the result of Question 1 shows that the two groups have similar capacity of mathematical calculation. The big gap in Question 2, however, indicates that students in the bilingual school had greater difficulty dealing with word problems in L1

than their counterparts in the regular school. This clearly indicates that students of the bilingual school failed in 'the meaning-making process that involved reciprocal exchanges between readers and a particular purpose or task' (Martiniello 2008, p.335).

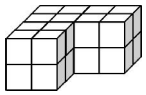
This finding is in line with both groups' Mandarin Chinese proficiency, that students in the regular school performed significantly better than students in the bilingual school (F=11.271, p=0.001). Better L1 proficiency in students from the regular school contributed to their text comprehension in L1 when solving arithmetic word problems. This demonstrates that linguistic proficiency is also a factor in solving problems apart from mathematical skill (also see Abedi and Lord 2001; Cummins et al. 1988; Verschaffel, Greer and De Corte 2000). That the bilingual school students' lower proficiency in L1 may have resulted in their worse outcomes in math echoes Austin and Howson's (1980) view that mathematics is a language. Accordingly, it can be said that mathematics cannot be treated as a language-free subject.

In a study conducted by Carpenter et al. (1980), it was suggested that children perform 10 to 30 per cent better on comparable problems presented in numeric format than on arithmetic word problems. Mathematics learning needs fluency in the language of mathematics, such as words, phrases, symbols, reading, writing and ways of speaking, which are specific to mathematics (Setati and Adler 2000).). Accordingly, mathematical skills are not the only factor related to mathematics achievement, but language proficiency is also important in solving word problems (Zehler et al. 1994). This highlights the importance of the medium of instruction in mathematics classes.

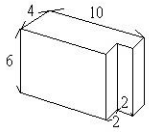
The preceding sections have focused on language as it relates to the learning of mathematics. This also explains why the bilingual school students in this study did not outperform their counterparts in the regular school in maths. In addition, mathematics encompasses a wide variety of skills and concepts, which are related and often built on one another (Mazzocco 2005). As students advance to higher grades, mathematics requires a higher order of thinking, making it more difficult to comprehend due to their limited progress in L1 (discussed earlier). This may lead to a situation where students who fail to follow the basics will not progress. This could explain why the bilingual school students of the sixth grade displayed a dip in their mathematics achievements. In the mathematics test (in L1) given in the third grade, there was no significant difference between the groups, though the regular school students were slightly better (mean = 16.8, compared to 16.4). In the sixth grade, the regular school students turned out to be significantly better (mean = 17.6, compared to 15.7). The bilingual school students not

only had significantly lower maths scores at that level, but also showed a dip in their maths achievement since the third grade, which further widened the gap with their regular school counterparts. This increased performance difference in the sixth grade may reflect a later disadvantage of the bilingual programme. This can be illustrated by examining the following questions given to the students. Question 3 for third graders correlates to Question 4 for sixth graders. Whereas students of the third grade of the bilingual school performed similarly to their counterparts of regular school, the performance gap was wider for sixth graders.

Question 3: How many building blocks are there?



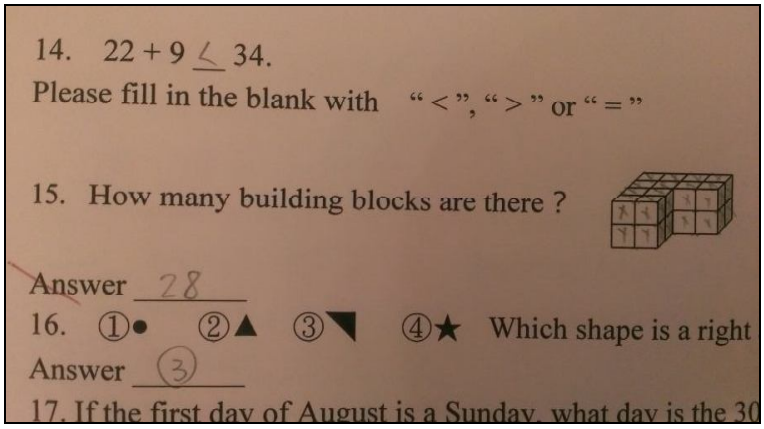
Question 4: What is the external volume (cubic metre)?



For the third grade, 9 out of 82 students in the bilingual school answered wrong in both L1 and L2. The correct answer is 24, but the answers they gave were mostly 28 or 20. In regular school, 7 out of 76 students got the answer wrong. Among these 7, 5 said 28. There is no significant difference between these two groups.

The building blocks present numbers and shapes. The volume of an object represents the three-dimensional space occupied by that object. The students needed to perform certain mathematical actions, including counting, adding and subtracting, in order to calculate the volume of an irregular object once they know how to calculate the volume of a single three-dimensional object. This is based on the spatial and geometric concepts (Sarama and Clements 2002). Without the correct spatial and geometric concepts, they will not be able to do so. Cheng (2011) found that students' with better spatial and geometric concepts and measuring skills are better able to solve problems regarding volume. From the test paper handed in by a student who gave 28 as the answer, it was found that the block faces were marked by a pencil (Photo 4-1). Thus, students who answered 28 had difficulties with spatial structures.

Photo 4-1 math test for 3rd grade of bilingual school



For the mathematics test question for the sixth grade, 15 and 17 out of 78 students in the bilingual school answered wrong in L1 and L2 respectively, whereas 7 out of 73 students in the regular school got the answer wrong. Thus, sixth graders of the bilingual school were found to perform worse in problems regarding volume compared to third graders in the same school.

Another example can be used to illustrate the difficulties that the bilingual school students had when they encountered advanced maths concepts. In a mathematics test for the third grade, students of the two schools responded very differently towards the following question:

Question 5: A piece of rope is 20 cm long. If the rope is cut into pieces of: 1) $\frac{1}{2}$, 2) $\frac{1}{4}$, 3) $\frac{1}{5}$ and 4) $\frac{1}{10}$, which piece would be the shortest?

In the bilingual school, 23 out of 82 students answered wrong in English, whereas 22 out of 82 students answered wrong in Mandarin Chinese. One student gave the correct answer in Mandarin Chinese but a wrong answer in English, suggesting that it wasn't a language comprehension problem but unclear concepts about fraction. In the regular school, 11 out of 76 students got the answer wrong in Mandarin Chinese.

Most students with the wrong answer chose $\frac{1}{2}$, possibly influenced by the number 2, which is the smallest among 2, 4, 5, 10. Clearly, in the bilingual school, students neither had the correct idea of what the notation $\frac{1}{2}$ denoted, nor about equal-sized parts of a whole. The third-grade textbook contains the basic information about fractions, that a fraction represents a part of a whole. This is an important concept

in mathematics and is used in real life as well, like dividing a pizza or a space. Without basic knowledge of fractions, students will not be able to proceed to adding, subtracting, dividing or multiplying fractions.

In the mathematics test for the sixth grade, students of the bilingual school performed much worse on the following question:

> **Question 6**: A basket has 14 apples, 8 oranges and 26 plums mixed randomly. If you close your eyes and grab a fruit from the basket, what is the probability that you will pick an orange?

It was found that 21 out of 78 students of the bilingual school got the answer wrong, whereas 10 out of 73 students of regular school did. The basis of the concept of probability lies in fractions. Besides, fractions are also related to decimal numbers, percentage and division, which comprise a significant part of the elementary school mathematics syllabus. If students do not comprehend fractions, they are unlikely to be clear on related concepts. This could be why there was no significant difference between the third graders of the two schools, but sixth graders of the bilingual school not only had significantly lower maths scores, they also showed a dip in their maths achievement between the third and sixth grades, further widening the gap with their regular school peers. The result was that the sixth graders seemed to lack basic concepts that they were assumed to possess to grasp the more complex topics taught as they advanced in school. Thus, it was not surprising that the sixth grader of the bilingual school did worse in the mathematics test than their counterparts in the regular school.

The result of this study confirms Hypothesis 6 that bilingual school students perform better in L1 maths compared to the L2 version. The data shows that *all* bilingual school students, regardless of grade, performed better in L1 than in L2. Comparing the two, it was found that some questions were answered correctly in L1, but not in L2. This indicates that students cannot transfer maths concepts from one language context to the other. This can be illustrated by the following example.

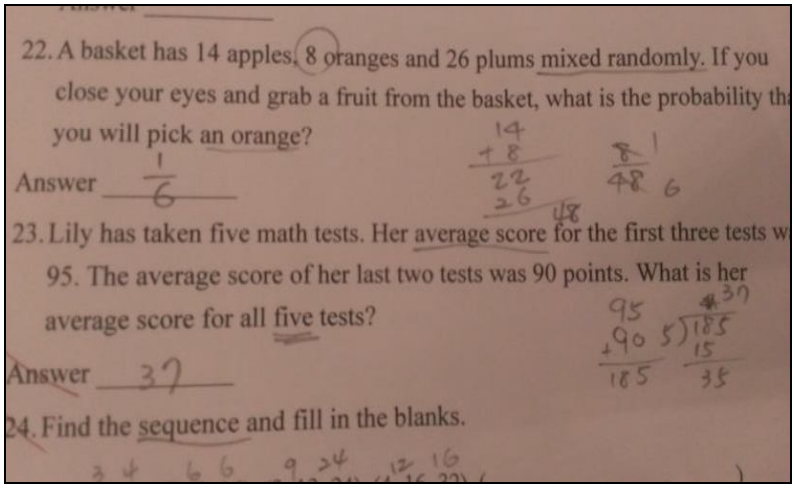
In the maths text for sixth graders, the following question focused on the concepts of averages:

Question 7: Lily has taken five maths tests. Her average score for the first three tests was 95. The average score of her last two tests was 90. What is her average score for all five tests?

It was found that there was a big gap in the numbers of correct answer in L1 and L2. In the bilingual school, 13 out of 78 students did not give a correct answer in L1, whereas 28 students did not reply correctly in L2. The students answering wrong in both languages overlapped (13). The remaining 15 students who answered incorrectly in L2 did answer correctly in L1. Therefore, it can be assumed that a language problem contributed to the gap in correct answers.

Among the 15 students giving the correct answer in L1 but not in L2, one answered 92.5, one answered 86, one answered 87, and three students answered 37. Others left the answer blank. One student was found to have handwritten notes on the test paper (Photo 4-2). He had added 95 to 90, and then divided it by 5, getting 37. The process of equations showed that this student had not understood the question properly in English. In other words, a language problem contributed to his wrong answer.

Photo 4-2 math test for 6th grade of bilingual school



During classroom observation, a similar question was posed by the English-speaking teacher. The interaction is presented in Extract 21. In Extract 21, Students learnt the concepts of average already in L1, so they should have answered correctly in the L2-medium class. However, after this L2-speaking teacher posed the question, one student sitting at the back asked what they were required to do. Obviously, this teacher's instructions were not clear to this student. There were probably more

students who did not follow, but they remained silence. In Chang's (2011) study, group harmony, self-dignity, avoidance of showing off and the teachers' intolerance of reticence can be the reasons which result in students' silence in class in Taiwan context. The term 'average out' in L1 was heard whispered in the classroom. This suggested that the students did know the concept of average, but they could not apply it in an L2-medium class. Students often used L1 translation tools such as e-dictionaries to deal with comprehension problems in L2-medium classes (Photo 3-9). This could explain why they gave correct answers in L1, but failed to do so in L2.

Questions 1 and 2 (mentioned earlier) for third graders highlight this point as well. In the bilingual school, there was a large gap between students' performance in the two questions in English. The same students performed worse in Question 2 rather than Question 1, which suggests that they had greater difficulty in translating English words into mathematical symbols than dealing with mathematical symbols only. That is, students in bilingual school suffered linguistic difficulties when solving arithmetic word problems in English. The bilingual school students' English proficiency interfered with their learning in the English-medium maths class. This explains why these students performed significantly better in Mandarin Chinese than English maths classes.

This result challenges the view of transfer of skills across languages (Cummins 1981, 1998). According to the view of cross-linguistic transfer, maths taught in L1 does not need to be retaught in L2. However, there was no evidence of cross-linguistic transfer based on students' maths achievement in L1 and L2. Wakabayashi (2002) further suggests that the transfer of linguistic skills occurs only after children's L2 has been developed to certain level of proficiency. This echoes the findings discussed in Hypothesis 3 that the bilingual school students have not yet developed adequate L2 proficiency.

Since bilingual school students' L2 was in the early stages of development, a lack of adequate vocabulary in mathematics and higher cognitive skills in L2 reading led to students' underachievement in maths. That is, they were hindered from understanding word problems in mathematics tests (De Courcy and Burston 2000). Moreover, during classroom observation, it was found that teachers in L2-medium maths often used passive voice, something that is uncommon in students' L1. This echoes what Monaghan (1991) and Jones (1982) suggested that mathematical language was the main challenge for English language learners. It must be mentioned that although bilingual school students performed better in L2 than L1, it does not mean that their L2 is good

enough to support their comprehension in an L2-medium maths class. In addition, their CALP, which was specific to 'the social context of schooling' (Cummins 2008, p.72), and the language used for maths are not exactly the same. Some studies suggest that it is necessary to teach vocabulary related to mathematics to help students overcome the difficulties they may encounter (Cummins et al. 1988; Monroe and Orme 2002). However, in L2-medium maths classes, English-speaking teachers were found not to allocate much instructional time to the language of mathematics. At the beginning of each new unit, they introduced the new terms, such as "Estimate quotiations" (Photo 3-20) and applied them to the lesson right away. Students were found to be provided with few opportunities to acquire mathematical vocabulary. In other words, a lack of English vocabularies related to maths may have made the students suffer. It can be said that bilingual school students' L2 language proficiency levels related to maths learning may have resulted in their relatively poor achievements in L2 (Bernardo 1999; Clarkson 1992; Dawe 1983). What bilingual school students first need to learn is L2 language itself related to maths. Their worse mathematics achievement in L2 suggests that their language proficiency does not reach a threshold level to benefit from an L2-medium maths class.

Through classroom observations, it was found that English-speaking maths teachers provided a more relaxing learning environment to students compared to local maths teachers in the bilingual school. Teachers in the L1-medium maths class gave more activities than teacher-led lectures, and set more class rules. They were also stricter with students. By contrast, English-speaking teachers ran more interesting activities and did not discipline students during the observed periods. Accordingly, the L2-medium maths class seemed a more friendly and enjoyable environment for learning. Additionally, all bilingual school students learnt the same content in L1 first and L2 later. Thus, in the L2-medium class, students should have been more relaxed because they were learning the same content for the second time. However, they were not. In the L2-medium class, they were less participative and would only interact when they were asked. They seldom chatted, always sat straight, and looked at the teachers or looked down at their textbooks silently. They appeared to be more tense compared to the L1-medium class. Therefore, it was assumed that the teacher's personality was less important than the language they used in explaining students' participation. If students did not understand the teacher's instruction, they were likely to feel anxious and nervous, which negatively affected their participation in class. From the classroom

interactions, students seemed more appreciative of the L1 medium for education by participating more in classroom activities. L2 as a medium of instruction seemed to be the main reason for the difficulties faced by the students in the bilingual school. The next section will discuss this in more detail.

It was found in classroom observations in the bilingual school that students were taught in L1 first and later given more maths practice in L2 (though not taught the same contents in L2 again). So far, there has been no research design corresponding to this study, where bilingual school students receive L1 maths instruction first and L2 later. In this study, bilingually schooled students had the same amount of time allotted to L1-medium maths every week as their counterparts in the regular school. In addition, the bilingual school students had extra instructional time devoted to L2 math. Given this background, and as discussed earlier, although the two third-grade groups showed similar maths achievement at the beginning, a gap between the maths performance of sixth graders of the two schools surfaced over time, suggesting that the bilingual students experienced difficulties in maths learning later on. Sixth-grade bilingual school students displayed a dip in their mathematics achievement in spite of having extra L2-medium maths classes compared to their regular school counterparts. It appeared that they learnt very little or even nothing in L2-medium mathematics. Although bilingual school students performed better in L2 than L1, it did not mean that their skills were good enough to understand maths content clearly through L2-medium instruction. Accordingly, it can be concluded that the English-medium maths class did not provide students with any additional help in overcoming language barriers that hindered the learning of maths concepts. This seems to meet the fundamental pedagogical principle that content is best taught in children's L1 (Cummins 1979, 1980, 1981, 1991, 2001; Dutcher 1995). Even though they were expected to learn better than their counterparts in the regular school, bilingual school students did not outperform counterparts in L1 mathematics.

It must also be pointed out that, under this study, the sixth graders of the bilingual school did not reach a lower threshold due to their lack in better performance neither in L1 nor in L2, compared to their peers in regular school, which resulted in worse math achievements as a reflection of their worse development in cognition. The goals for bilingually taught subjects, such as mathematics, are to help students with the contents of the subjects as well as with English development. This is known as 'content-based instruction' and is promoted by educators (Short 1997; Snow 1998; Stoller 2004).

However, the findings of this study do not back the goals of the institution.

This analysis identifies three main obstacles bilingual school students encountered in maths classes of both grades:

1. understanding of mathematical terms in L2;
2. mathematical misconceptions; and
3. L2 as the only medium.

In De Courcy and Busston's (2000) study, they responded to the positive results found in the secondary level as shown in Jabrun's (1993, 1997) and Berthold's(1992) studies. De Courcy and Busston (2000) explained that the language used in mathematics classes in the upper grades becomes more informative and more formal in order to refer to concepts and abstract relations. Accordingly, learning mathematics in L2 at elementary and secondary levels is different. However, students who start to take L2-medium maths at the secondary level have built up their mathematical concepts through L1 in elementary school.

The academic implications of the findings are that students who are not proficient in the language of instruction tend to perform worse in mathematics, even in L1. As discussed earlier, bilingual school students' L1 was not developed enough to support their cognitive growth to deal with mathematics questions. Therefore, L1 should be given priority compared to other subjects. Due to the strong link between students' lower level of class participation and their relatively lower educational achievements compared to their counterparts of the regular school, the bilingual school and teachers in charge of L2-medium classes need to carefully consider what linguistic skills students learn from L2 language classes and if these are enough to prepare them to function successfully in L2-medium maths classes. Teachers need to be aware that the linguistic demands the L2 language class makes on the students may differ considerably from the linguistic demands made by an L2-medium maths class. Accordingly, teaches need to reduce the language load as much as possible in maths tests in the hope of realising students' true knowledge in the subject. In addition, the distance between Mandarin Chinese and English may exist as coping with mathematical concepts (Han and Gisburg 2001). Against such a complex background, the value of having an English-medium mathematics class is called into question if students learn English as a foreign language and do not have the requisite proficiency to benefit from such instruction.

4.4 Discussion of Hypothesis 7

Hypothesis 7: The regular and bilingual school children differ significantly in classroom participation, initiative taking and fearlessness.

The finding of this study partly confirmed this hypothesis. It was found that the bilingual school students tend to be more negative in interacting with the teachers in L2-medium class than that in L1-medium class, particularly in the math through L2 medium instruction. However, bilingual school students were found to behave similarly in L1-medium class comparing to their counterparts in L1-medium class of regular school. That is, the bilingual school students did not behave significantly different compared to their counterparts in regular school, but the difference in behaviors only occurs in the case of the different medium instructional languages.

Compared to the dimensions of L2 language class in regular school, the bilingual school was found to have more advantages for bringing in good learning, such as teachers' more friendly attitudes towards teaching and small size of class. The speaking teachers of this bilingual school were found to try to establish a positive relationship with their students, either in English class or in L2-medium math class of 3rd and 6th grade. The favourable classroom atmosphere may lead to good learning (Hirschy and Wilson 2002). In Aboudan's (2009) research, teachers' humor was found to be an effective way to contribute to L2 learning. In his research, 80% of the participants pointed out that teachers' jokes help to draw their attention, and further help them to learn more. In addition, the evidence from the class observation showed that, compared with the local and English speaking teachers in the bilingual school, the teachers in regular school were found to spend more time on disciplining students and keeping class orders. It can be said that the teachers in regular school are stricter than the counterparts in bilingual school. This echoes the difference perceived by Medgyes (1992) between native English Speaking teachers and non-native English speaking teachers. In bilingual school, the English speaking teachers speak English clearly and show an easygoing attitude in class no matter it is English or math class. In addition, small size of class is identified as a better one to shorten the relationship between the teachers and students than large group in terms of language learning (Holliday 1996). However, it is not the same results found in the L2-medium classroom in bilingual school.

Regardless of the above-mentioned advantages which may contribute to a better learning, the bilingual school students still demonstrate a more negative classroom participation in L2-medium than L1-medium class. Bilingual school students with less active class participations in L2-medium class, including L2 and math class, also respond to their similar proficiency in L2 compared to their counterparts of regular school, and lower achievements in math in L2 compared to their math achievements in L1. As Vygotsky (1962) stated, new knowledge can be constructed through meaningful interaction. In the process of construction, teachers and students need to work together to create grammatical forms and meanings of words (Ohta 2001). Accordingly, from a language acquisition point of view, meaningful interaction is considered a significant factor in language development. Therefore, it is necessary to find the factors which negatively impact students' classroom participations.

The data collected from classroom observations in the both types of medium of instruction classrooms, there were two factors that would affect students' classroom participation. One was language factor. In L2-medium classrooms, due to teachers with very little knowledge of students' L1 and students' low L2 proficiency, students tended to take less participation in class activities. The other was cultural barriers. This caused misunderstanding and communication breakdown between L2 speaking teachers and native L1 speakers of students. In the following section, the focus would be on the two factors identified as the reasons hindering students from taking active participations in L2-medium classrooms. The first one is their linguistic knowledge in English can not support them to follow or express their ideas in demanding academic content courses in which English is the medium of instruction, and the other is the cultural gaps between teacher and the local students.

Language factor

As Cook (1999) suggested, in L2-medium class, every activities were run visibly in L2 as well as invisible in L1. This seems to suggest that L1 seems impossible to be denied the existence of L1 even students utter in L2. L2-only policy seems to "disguise the presence of the L1 in the minds of the students (Cook 1999, p.197). When the instruction of language factor was considered alone, some significant difference between the two-school groups in their facial expression, behaviors and class participation have been detected during the classroom observations. It was found that

the class conducted by English speaking teacher reveals a different picture from what conducted by the local teacher.

As discussed in chapter 3, bilingual school students of grade 3 and grade 6 demonstrated a strong sense of anxiety by sitting still and keeping silent in L2-medium class, specially in the math class. No matter it is in English (L2) or math class conducted by native English speaking teachers, when questions were posed, the majority of the students quickly looked down at their textbooks. Some of the questions were obviously easy, and students were supposed to know the answers in their mind. However, very few students responded to the teachers actively. Sometimes, the English speaking teacher in math class tried to cheer up all students by saying some humorous words, but students still sat seriously and their facial expressions did not show any relaxing sign. In other words, students do not feel comfortable but fearful in the mathematics class conducted in English that they are not familiar with. Therefore, they have to screw up to take this class. Different from what happened in the same students in math class conducted by local teachers, it is observed that students felt more relaxed and the interaction between the local teachers and the students were more frequent than that in the same course, mathematics, conducted by the English speaking teacher. In L2-medium class, students' negative participations, serious facial expressions and considerably decreased rate of speech in the class conducted in English can be interpreted as an inflection of joyless learning.

According to the classroom observations, it is very clear to see these students' facial expressions and behaviors quite varied due in the two classes. A demand to answer a question in L2 may result in students' anxiety (MacIntyre 1995; Horwitz, Horwitz and Cope 1986). Students' silence may also serves as an act of unwillingness (Nikula, 2005). In Schweers' (1999) investigation on the use of Spanish in EFL class, it was reported that 88.7% of Spanish students want Spanish to be used in the English learning classroom. Although in the current study, the researcher was not allowed to talk to students, it can be assumed that the students in L2-medim classes of bilingual have the same desire as the Spanish students in Schweers'(1999) study to use L1 in the L2 classroom based on the observation that bilingual school students tend to use L1 for communication during break time and even in L2-medium class.

In the mathematics class of grade 3 and grade 6 conducted by English speaking teacher, students are often asked to discuss in the group of 5 or 6. Students are observed to discuss mostly in L1 even in front of the L2 speaking teachers regardless of the

teachers' reminding words, 'English please'. This seems to suggest that students are not unwilling to follow the agenda of English only settings, but sometime their level of English proficiency hinder them from using English to participate in group discussion. Bilingual school students' co-presence of Mandarin Chinese and English might reflect their poor English proficiency, which might result in their possible difficulty in catching up in L2-medium class. In addition, the conversations between students are typically carried out in L1 that they are most familiar with and feel more comfortable to use. This might also reflect students' linguistic preference. Accordingly, it is not surprising to find their tension and low class participation in the class conducted by L2 speaking teachers.

A study from Hong Kong reports similar findings. Luk (2001) surveyed secondary school students to see how they responded to being taught by native English teachers (NETs). The results show that talking to NETs makes students anxious, so 44.8 per cent students do not want more NETs in the campus. Luk further explains that students' anxiety mainly comes from the fear that NETs cannot understand students' L1 (Cantonese). MacIntyre & Gardner (1991) ever suggested that when learners' L2 proficiency and experience increase, their anxiety may decrease consistently. English is more often used in Hong Kong than in Taiwan. If secondary school students in Hong Kong are afraid of talking to NETs, what about elementary school students in Taiwan where English is a foreign language? The foreign language anxiety coming from elementary school level in Taiwan tends to be more significant than in Hong Kong.

Levine (2003) found a significant negative relationship between the reported amount of TL use and TL-use anxiety among college and university students. It reported that more L2 use may help learners feel more comfortable with L2. Here what the argument is that college and university students have experienced English use for years. No matter what their English proficiency levels are, they get used to it. However, students in the bilingual programme in Taiwan context are still new in English use. Before school, they rarely have the chance to get alone with foreigners. In addition, teachers are viewed as authority in the classroom in Taiwan context (discussed in the section of Cultural Factor, Discussion of Hypothesis 7). Students' anxiety could be explained by both their low L2 proficiency and the power-distance between teachers and students. Accordingly, students may not be willing to ask questions directly to the teacher in the classroom.

The high English language demand for understanding abstract and complex math

concepts makes math learning more difficult for English language learners. What needs to be noted is that the bilingual school students did not demonstrate higher English ability than their peers in regular school. Students in English-medium class of bilingual school experienced much greater problems in learning English and math through a foreign language. Foreign language as the medium of instruction may bring difficulty for students to clearly follow new math terms that are different from the everyday language. In addition, Mathematical texts are usually presented with passive voice. For example, "when sixteen is divided by two, what is the answer?" The passive voice is more complex for Mandarin Chinese speaking students learning English as a foreign language. The possible difficulties related to the learning of math in a foreign language is consistent with the much lower mean score in L2-versioned math in comparison with that in L1-versioned math, which indicates that students perceived significant difficulty in following L2-medium instructions in math class. Students' low mean score in L2-versioned math test also explains their passive participations in class. Students' communicative competence may be developed through classroom interaction with teachers or classmates (Hall 1993). In the English-medium classroom of bilingual school, students tend to less engage in interactive learning activities to develop their communicative skills in language. If linguistic skills can be transferred between L1 and L2, students' lack practice in L2 communicative skills also negatively impact on their communicative skills in L1. In L2-medium class, students can not cross the gap of languages between teachers and themselves. This may explain why the bilingual school students under the present study have been exposed to L2 much more than their counterparts in regular school, but they neither perform significantly better in L2, nor in math.

Cultural factor

The findings presented in the section of Language Factor previously had suggested that L2-medium instruction was a factor negatively causing students' low participation. In addition to language factor, cultural differences were found to cause miscommunication between English speaking teachers and students of Taiwan in bilingual school. Studies on different groups of native speaking teacher and non-native speaking teacher in the EFL classroom have examined mainly on the advantages and disadvantages bring to the class in terms of language teaching (Kirkpatrick 2010; Cook

1999; Pacek 2005; Medgyes 1992; Ryan 1998; Mahboob, et al, 2004; Walkinshaw and Oanh, 2012) and culture teaching (Mahboob, et al, 2004; Ryan, 1998), but not how the different culture backgrounds of native speaking teacher and non-native speaking teacher positively or negatively impact the classroom discourse. The majority of the research was conducted by questionnaire to gain the picture of students' perceptions on native speaking teacher and non-native speaking teacher, but the current study was conducted by classroom observation to see how different culture backgrounds of the teachers influence classroom communication. Miscommunication between people from different cultures is also found in Fat's research (2004).

During classroom observations, it was found that the culture gaps were reflected in the communication among English-speaking teacher and students in L2-medium classes. Take Extract 23 and 24 as examples. In Extract 23, when the topic was on Thanksgiving Day, this English-speaking teacher thought that students of Taiwan were supposed to be familiar with Thanksgiving Day and confirmed this by keeping saying "you all know this holiday, right?" Thanksgiving Day is a national holiday celebrated primarily in the United States and Canada as a day of giving thanks for the blessing of the harvest and of the preceding year. However, only Catholic families celebrate this holiday in Taiwan. In addition, turkey is not easily found in Taiwan markets. His attempt was met with silence and some low voices saying 'Thanksgiving Day' in both English and Mandarin Chinese. Some students replied in Mandarin Chinese probably because they did not know how to say it in English. However, they kept silent finally when the teacher confirmed with the students again. Here a communication breakdown occurred. The students' silence confused the teacher, and accordingly he responded negatively by saying, 'You guys don't want to answer me.' In English-speaking countries, students are expected to answer and ask questions in the class to show their interest and attention (Helgesen and Brown 1994). However, Taiwan is embedded by Confucius cultures, which teachers are viewed as authority figures in Taiwan, as 'high power distance communities' (Hadlley 2001). Taiwan students grew up with this conception that a good student is expected to respect and not to challenge the teacher. As a result, Taiwan student tend to keep silent in class, which functions to mark boundaries in the discourse according to Sinclair and Coulthard's (1992) speech act. This may make western teachers mistake students' silence for nonparticipation and even feel themselves to be ignored by students (Scollon and Scollon 2001).

Another feature of traditional Taiwan culture is “face”. “Face” refers to “dignity”. In Extract 23, the reason why nobody told the teacher that he did not know what a Thanksgiving Day is may due to “Face”. The whole class may laugh at him if only he did not have any ideas about Thanksgiving Day. To avoid being stupid in front of the class, the better way is to keep silent. This may be the reason why no one told the teacher the truth but kept silent. In this study, this English speaking teacher sound nice to students; however, his role as a teacher and lack of L1 proficiency and local culture seemed to impact the quality of the teacher-student interaction.

In Extract 24, the English-speaking teacher was not familiar with the food culture and caused students’ hesitant and confusion. The English-speaking teacher asked one student, John, to cut one small of piece of cheese for his family. However, eating cheese directly is not the way Taiwan people do with cheese. Accordingly, John was hesitant and kept silent. Being pushed by the teacher again, he finally asked the teacher, “You mean cheesecake? A round one?” Apparently, the teacher lacks the knowledge of food culture in Taiwan, and accordingly offers a wrong example for students. Thus, the misunderstanding caused by the lack of understanding students’ culture might result in a communication gap between teachers and students.

Bilingual school students under this present study demonstrate less class participations and show more fear, which is against the result suggested by two research that students take more active participation and learn more happily in EFL class conducted by L2 speaking teachers than by local teachers in elementary school in Taiwan (see Cai 2002; Jheng 2004). It may be explained by the different level of pressure of learning that was encountered by the students in different types of learning situations. In regular elementary schools of Taiwan, local teachers are in charge of EFL class. Few of them have native English speaking teacher in their campuses. If yes, native English speaking teacher conducted only one 45-minute class a week and local teachers are responsible of the rest. Native English speaking teacher tend to teach pronunciation and oral daily expressions whereas local teachers tend to teach vocabularies, grammar and sentence patterns. In addition, the English language test only focuses on linguistic knowledge which is taught by local teachers. Obviously, students feel more relaxed in the class conducted by native English speaking teacher. However, in bilingual school, the EFL class conducted by English speaking teachers is not the same case. In bilingual school, the EFL class conducted by English speaking teachers is treated like other formal class. EFL class not only focuses oral English, but also reading

comprehension. Students need to be examined if they follow the class by taking tests. Accordingly, they need to screw up in the class. That's why EFL class conducted by English speaking teachers in regular elementary school is not the same case in bilingual school. Accordingly, it is not appropriate to deny the existence of younger learners' foreign language anxiety.

In addition, this bilingual school labeled English class as "English-only" class by having English speaking teachers to run the class. "English-only class" is often used to refer to any class run by English only without use of other language. Teachers in bilingual programme in western countries, such as Canada, often mastered two languages. One is students' language and the other is the target language. Although some teachers adhere to a one-language policy, they understand students' L1 (Roberts 1995). However, in this observed bilingual school, all English teachers do not know or know very limited students' L1 and culture, which easily caused communication breakdown between English speaking teachers and students. This is also very common for the majorit y of the English speaking teachers in Taiwan. English cannot but the only language bringing communication between teachers and students. Accordingly, "English-only" can not exactly indicate whether teachers understand their students' L1 or not. Therefore, it is suggested to use "L1 mediated L2" to label such class conducted by the teachers who do not know students' L1, instead of the term "L2-only", which teachers may know or may not know students' L1.

The findings above raise another extremely central issue regarding the advantages and disadvantages between NETs and NNETs. Much research has documented that the strengths of native English teachers in English learning class include high proficiency in English, ability to use English functionally, and the awareness of the cultures of English speaking countries (Ma 2009). However, native English teachers do not have the ideas about students' culture, which may negatively impact students' achievement. Differently, the local teachers of English know both students' L1 and the L2, which is viewed as one of the advantages in L2 teaching and learning. However, traditionally, the local teachers of English are usually criticized by their "underdeveloped communicative competence" (Firth and Wagner 1997,p.285). However, nonnative teachers can acquire the near-native language proficiency through training (Phillipson 1992). Contrast to the local teachers of English, the good models of English set by English native teachers are emphasized. However, based on the pedagogical consideration, the ideal native English speaker teacher should have certain knowledge

about learners' L1 and culture.

Students' lower language competence may negatively impact on their frequency of in-class participation due to the gap of language (Evans and Fisher 2005). In addition, teacher's little knowledge of students' language and culture may hinder students from positively building up closed relationship (Pandey 2006). Evidence collected in this study supports the hypothesis that in general, the regular school students were found to display better interactions with their teachers than their bilingual school counterparts in L2-medium classes. What is of concern is that such a situation was found to accelerate over time, creating a greater gap between the sixth graders of the two-school groups. Regular school students, apparently with less exposure to L2 and with L1 support, appeared to be more active in classroom activities in L2 class. In other words, they were more ready to join classroom activities. On the other hand, the bilingual school students were found to exhibit a higher level of anxiety in L2-only mathematics class. This unveiled the emergence of the anxiety in their math learning, which might gradually built up as a result of the difficulty they had to encounter before they reached the threshold for satisfaction in the language learning when they were confined to the L2-only learning environment.

Chapter 5 Conclusion

5.1. Introduction

This final chapter summarises the main findings of the study and explores their implications for research, policy and practice of bilingual education. In the next sections, the problem, methodology, objectives and the main findings are recapped and linked with the research questions. In the fifth section, the conclusion is presented. The sixth section deals with implications for bilingual schools in Taiwan, and the other two sets of implications about the value and practices of bilingual education, specially in a place where L2 plays the role as a foreign language. The seventh section addresses the potential contribution of this study, and a few suggestions for improving practice in Taiwan and bilingual education in general are made. The eighth section presents some of the limitations of the study, and the final one suggests a couple of research channels that can be pursued in future projects.

5.2 Problem and Methodology

In response to weak outcomes in English learning, bilingual elementary schools have mushroomed in Taiwan. One of the important goals of such schools is to help students become additive bilinguals. Accordingly, my aim in this study was to investigate how well bilingual elementary schools help students learn L2 and maintain their L1 proficiency, and achieve better results in mathematics. Comparisons were drawn between the performance of children in grades three and six studying at a L1-L2 bilingual elementary school with those of students studying in grades three and six in a regular elementary school in Taiwan. Since L2 instruction begins in the first grade in both the schools, third graders were chosen for this study because both sets of students have had two years of exposure to English language education. The sixth grade was chosen because it is the final year of elementary school. Grades three and six, accordingly, were the target groups of this research.

These four groups had been given grade-appropriate tests in L1, L2 and mathematics (L1 version). In addition, bilingual school students were given the same mathematics test in L2. The L2 mathematical content corresponded exactly to the L1 version. To minimize the chance that students remembered the answers, the L2 version

was given to bilingual school students twenty days after they had taken the same mathematics test in their L1. Classroom observations were also incorporated within the design to get first-hand information behind the data. A tape recorder was used while the researcher also took notes, such as of facial expressions, gestures and classroom atmosphere. All observations were written down during or right after the class. This method provided a better understanding of the interactions and activities taking place in the classes of these two types of schools.

5.3 Objectives

The main objectives of the study were:

- To study if L1 is an indicator of the good L2 learning in Taiwan.
- To examine if L1 is an indicator of the achievement in non-language subjects like mathematics in Taiwan.
- To compare the participation, initiatives and fearlessness among students in L1-medium and L2-medium classes in Taiwan.
- To examine if the medium of instruction matters in math class in Taiwan.
- To find out if the bilingual school functions well in the Taiwanese context in terms of L1, L2 and mathematics learning.

Given below were the hypotheses that were tested in this study:

1. There will be a positive corelation between Mandarin Chinese proficiency (L1) and English proficiency (L2).

2. The students from the regular school will perform significantly better than those from the bilingual school in Mandarin Chinese proficiency (L1).

3. The students from the bilingual school will perform better than those from the regular school in English proficiency (L2).

4. There will be a significant positive relationship between Mandarin Chinese proficiency (L1) and Mathematics.

5. The bilingual school children will perform better in mathematics than their regular school counterparts.

6. The bilingual school students perform lower mathematics achievement in English version than in Mandarin Chinese one.
7. The regular and bilingual school children differ significantly in classroom participation, initiative taking and fearlessness.

5.4 Main Findings

Based on the framework of bilingual learning research, this paper sets forth research questions about the differences between regular and bilingual schoolchildren in their development of L1, L2 and mathematics. On the basis of analysis, the main findings and conclusions can be enumerated as follows:

1. L1 and L2 proficiency are positively correlated even if they belong to different language families. This confirmed the hypothesis that a higher L1 leads to better L2 performance for early graders.
2. In the bilingual school, the sociolinguistic environment clearly favoured L2 despite that the goal of the school being to cultivate students to be balanced bilinguals. This created an implicit language hierarchy.
3. Students from the regular school demonstrated significantly better proficiency in LI than those from the bilingual school. Additionally, it is found that the bilingual school students had a slower growth in L1 than their counterparts in the regular school. This supports Cummins' (1979b) argument that if children's L1 skills are less developed, a greater exposure of L2 in the very early grades is likely to hinder their L1 development.
4. Students from the bilingual school do not out perform their counterparts from regular school in L2 (English) despite significantly greater exposure to L2. Despite starting with lower L2 in the third grade, regular school students had a faster growth in L2 from the third to the sixth grade compared to the bilingual school students.
5. The bilingual school's early exposure to L2-only instruction (English-speaking teachers with a very limited knowledge in students' L1 and its culture) was found to result in difficulties in catching up with students' pre-schooling L1 experiences.
6. The L1-only and L2-only pedagogy adopted in the bilingual school did not successfully reach its goal to cultivate students to outperform their counterparts in L1-supported L2 practice in regular schools.

7. In both third and sixth grades of bilingual school, students were often found to use e-dictionaries in L2-medium classes and L1 translations were found everywhere in students' textbooks. This suggests that the students did not follow teachers in L2-immersed classes and they needed L1 translations to understand the content.
8. In such a context, where English is a foreign language, the disadvantages caused by an L2-only policy outweighs the advantages of the traditional myths that largely and totally L2-immersed class, L2-speaking teachers and smaller class sizes lead to better performance in L2. This finding challenges the commonly held belief that an early introduction to L2 learning by the native English speakers leads to better learning of English in Taiwan.
9. L1 was highly correlated with the mathematics (L1 version) performance both in the case of the regular school and the bilingual school. Better L1 proficiency in students from the regular school contributed to their text comprehension in L1 when solving arithmetic word problems. This demonstrates that linguistic proficiency is a major factor in solving mathematics related problems.
10. Despite starting with a similar achievement in mathematics, the bilingual school students showed a dip in their maths achievement since the third grade, which further widened the gap with their regular school counterparts. This increased performance difference in the sixth grade reflects a cummulative disadvantage of the bilingual programme in mathematics learning.
11. The bilingual school students with extra L2-medium maths class did not outperform their counterparts in the regular school. This clearly establishes the relationship between the linguistic and the metalinguistic resources developed in the first language and its role in the learning of mathematical concepts and solutions.
12. Every bilingual school student, regardless of grade, performs better in mathematics in L1 version than in L2 version. They were found to have greater difficulty in translating English words into mathematical symbols than dealing with mathematical symbols only.
13. It was found that English-speaking teachers provided a more relaxing learning environment to students compared to local teachers in the bilingual school, but they were less participative and would only interact when they were asked in L2-medium classes. Therefore, it was assumed that the teacher's personality and classroom atmosphere were less important than the language they used in explaining students' classroom participation, initiative taking and fearlessness in Taiwan context.

14. Language factor and cultural differences were found to cause miscommunication and sometimes breakdown of communications between native English speaking teachers and students of Taiwan in bilingual school.

5.5 Conclusions

The evidence gathered suggests that L1 is a strong indicator of good L2 and mathematics learning. With lower L1 performance, the bilingual school students could not outperform their counterparts in the regular school in L2 and mathematics despite having greater exposure to L2 and extra L2-medium mathematics classes. In addition, the two schools, having started with similar performances in L2 and mathematics in the third grade, showed further divergence in performance by the sixth grade. This finding emphasised the important role of L1 in academic development, and that the negative effects of poor L1 development on the learning of L2 as well as mathematics over a period of time. This suggests that investing in L1 development is crucial for building students' L2 proficiency and for strengthening mathematics competence among Taiwan children. This study clearly warrant the educators and parents against pushing kids join bilingual schools.

In addition to the close relationship between L1 and L2, the difference in L2 classes between the two schools was found to have significant effects on L2 learning. In the bilingual school, there was an L2-only learning environment, whereas in the regular school, it was an L1-supported L2 learning setting. The latter was found to help students more compared to L2-only language classes, especially during early schooling. This was also evidenced by teacher–student interactions. As Kagan (1986) suggests, positive teacher–student interactions often encourage improved educational outcomes. The classroom observations clearly showed two very contrasting L2 learning scenarios in this study.

In the L2-only class, including L2 language and L2-medium mathematics classes of the bilingual school, the teachers knew very little about students' L1. Students also had very little knowledge of L2 before starting school. In this context, where neither the teacher nor the students understand the other's language, in addition to students' burden of 'losing face', students, in general, made more mistakes and were less participative in classes. When they were asked by the teachers to respond in class, their contributions were relatively limited and contrived. Silence prevailed more in these classes. As a result, teachers remained the main speaker, with students being the silent audience. This

contributed to the asymmetrical power relationships between teachers and students. Beside this, the native English speaking teachers, with very little or no knowledge of the students' backgrounds were found to be far less effective in providing the students with useful channels to get access to lessons. This had a further negative impact on students' outcomes in L2.

Students' lower levels of L2 was also reflected by their preference for using L1 more than L2. They chose to speak L1 rather than L2 in group discussion in the L2-medium class. The big gap in students' behaviours and participation in L1- and L2-medium maths classes suggested that they felt more relaxed and participated more in the L1-medium maths classes. Students' frequency of class participations coincided with their maths achievement—third graders and sixth graders both performed better in L1-medium maths tests than L2-medium ones. Consequently, it can be suggested that in addition to displaying higher levels of classroom participation in L1-medium maths classes, students gained a better understanding of maths concepts when it was implemented with L1-medium instructions.

Different from the dynamics in the L2 class of the bilingual school, students of the regular school were found to be more actively engaged in the classes, asking and answering questions. This was encouraged by their ability to use a language that they were familiar with and felt comfortable to use. The more significant finding was that the advantages resulting from the practice of code switching in the classroom was found to transcend the advantages identified by some researchers as quality conditions for L2 learning, such as small class sizes (e.g. e.g. Nye, Hedges and Konstantopoulos, 2002), greater exposure (e.g. Masgoret and Garner 2000), and L2-only teaching practice (e.g. Genesee 2008; Genesee and Lindholm-Leary 2013). This strongly indicates the important role of L1 in L2 learning in the early grades in a context where L2 plays the role of a foreign language. This sheds light on why L2-only teaching in early grades may not be able to deliver the advantages reported in other bilingual contexts on students' L2 learning (for example, Baker 2001; Hofifmarm 1998; Lindholm-Leary 2001).

Bilingual school students performed better in L2 than in L1. This was not expected. It was found that the overwhelming emphasis on L2 proficiency influenced students' motivations for learning L1. This result highlights the importance of the social context on students' L2 learning. Despite L1 being the dominant language, given the preference of parents and the school for L2, its learning was valued higher than L1

learning. This perception is in fact a reflection of the general preference in Taiwanese society for L2. It can, therefore, be extended to explain why little attention has been directed towards what happens to bilingual school students' L1 development over time.

According to the research, balanced bilingualism or high proficiency in both languages will lead to a better academic achievement (Cummins and McNeely 1987; Cummins 1991; Lindholm 1990; Marian, Shook and Schroeder 2013). As discussed previously, in this study, the students attending the bilingual programme did not outperform their regular school counterparts in either subject. In light of these findings, we can conclude that the language planning of bilingual schools in Taiwan has largely failed to help students become real bilinguals, as claimed by Baker (2001).

Cummins (1981) and Baker (2001) have suggested that there is a threshold level of linguistic competence that bilingual children must attain. If they are relatively balanced and proficient in the two languages, it will help them avoid cognitive deficits and positively influence their potential for cognitive growth. However, in this study, bilingual schooled students did not outperform their counterparts in either language. This seems to suggest that bilingual students of the sixth grade neither reached the higher threshold nor benefited from bilingualism. In other words, these students were not balanced bilinguals. The possible reasons for this may be their early exposure to English and the school's English-oriented policies, which have been discussed earlier.

In this study, students of the third and sixth grades were the samples. All the data were collected at the beginning of the academic year. That is, all the students of the sixth grade had attended the bilingual programme for five years. However, according to previous research, bilingual school students perform better in all subjects compared to their peers who have been educated in their L1 after four to seven years of such instruction (Collier and Thomas 2004). In addition, Cummins (2008) proposes the possible length of time required by English-as-second-language (ESL) learners to reach a native speaker's peer-appropriate levels in academic aspects of English is about five to seven years. Further, when L1 and L2 have dissonance, to acquire L2 would be more difficult and thus take longer. Thus, it is also possible that the bilingual school had a long-term positive effect on students' L1, L2 and maths proficiencies, which may not be visible until higher grades. This aspect still needs more research, tracking the development in L1 and L2 of bilingual students for a longer duration.

As discussed in Chapter 2, the view commonly held by the majority of Taiwanese

people is that, in comparison with regular school students, bilingual school students' greater immersion in L2-only classes were associated with being 'elite'. In other words, they were expected to have better educational outcomes than those in regular schools. However, the findings of this study indicate that a bilingual school is not a good choice in terms of students' linguistic performance and academic achievement in Taiwan. The outcomes of the evaluations of the bilingual school did not meet commonly-held expectations. The chances of such students learning L2 in an L2-only linguistic environment were not more promising than for those in a L1-supported learning environment. What made bilingual school students embarrassed was that they did not outperform their counterparts in the regular school despite having paid much higher tuition fees and being immersed in a relatively uneasy and unfriendly environment compared to their counterparts in the regular school.

Thus, the bilingual students' heavier burden in having to tackle a more difficult learning environment did not contribute to a relatively better learning result. More ironically, the school labelled itself as 'bilingual', which is what many people believe to be the best way to L2 learning in Taiwan, but in fact the pedagogy adopted was an 'L1-only' and 'L2-only' classroom policy. In reality, this strategy did not equal to L1–L2 bilingual teaching practices. By contrast, the pedagogy adopted in the regular school was an L1-supported L2 bilingual practice, in a context where L1 was generally regarded as a hindrance to L2. Based on the status of English in the sociolinguistic background of Taiwan, the English-only policy was accordingly considered to be better implemented as a late-exit bilingual model after students' Mandarin Chinese was more developed. Otherwise, an early and greater exposure to English cannot be used, as learning resources drawn from their first language.

Previous studies show that foreign language learning in combination with the rest of the core curriculum in the elementary school years tends to improve cognitive abilities and contribute to higher achievement in other subjects ((Swain, 1984; Garcia 2001). Following the trend to introduce English to the first grade of elementary school seems to be a positive approach. Cuevas (1984) claims that second-language learning becomes particularly difficult when the language forms learned first are those of the classroom'. This is true for Taiwanese students learning English as a foreign language. The findings reported in this thesis throw light on the fact that educational outcomes for students in the bilingual school neither mirrored the expectations and goals set by the

bilingual school itself, nor showed the good outcomes reported in similar educational contexts in various countries across the world. Accordingly, the design for bilingual programmes needs 'pedagogically sound, socially responsive, and culturally relevant approaches' (Ernst-Slavit 1997). The most important thing to be kept in mind is: 'It's not the model of instruction that matters—it's the quality' (Hamilton and Krashen 2006,p.24).

5.6 Implications

Based on the findings of this study, this section outlines the implications for bilingual schools in Taiwan, pedagogy and research in general.

5.6.1. Implications for Bilingual Schools in Taiwan

The cultural context of Taiwan where English is treated as a foreign language is different from that of Western countries where it is a second language. Taiwan students have less opportunities of immersion in English before formal schooling. The findings of this study help pinpoint some serious problems for the bilingual education model in Taiwan. Some of these are as follows:

1. Although the Ministry of Education has certain policies for elementary schools, there is no clear national policy on private bilingual schools. This absence leads to an uneven programme design in various bilingual schools. The bilingual school in this study does not support students with an effective learning environment despite asking for much higher tuition fees. In light of the findings of this study, setting up an explicit bilingual language learning policy should be a priority for policy makers in Taiwan. The policy needs to set up models for bilingual programmes to meet educational philosophies, support acquisition of both languages, and further adjust pedagogical practices to suit the Taiwan context.
2. The most significant finding was that the problem with the bilingual school lay first in the school's policy towards an English-only medium of instruction. In their view, that had the best advantages for acquiring English proficiency. However, the early first-grade English-immersed class needs to be adjusted as Taiwan students do not lean English well in an English-only environment

because of the place of English as a foreign language in the country. It is suggested that students need to be introduced to English gradually, not from the very beginning of formal education. In addition, they need to focus more on the learning of Mandarin Chinese, which forms the basis for their academic achievement, including learning English.

3. The English-medium maths classes were found to be too difficult for students to follow. The language used for maths is different from daily language, making students feel equally challenged by both language and math concepts. The negative impact of English-medium maths for early graders of the elementary level needs to be considered very carefully, and more attention needs to be given to English language instructions provided to students.
4. Having English-speaking teachers with limited knowledge of students' L1 and culture results in misunderstandings and breakdown of communications. This is embarrassing for both teachers and students. As a result, it is suggested that English-speaking teachers must have some knowledge of students' L1 and culture, or schools must have one local teacher to assist in English-medium classes. This is especially important for local students with low English proficiency, particularly in the early grades.
5. Due to the fact that English is a foreign language in Taiwan, students do not have any significant exposure to it before starting school. In addition, L1 was found to be closely related to the learning of L2. Therefore, it is suggested that a late-exit bilingual programme, particularly one insisting on an L2-only teaching practice, would be better for L2 learning in the Taiwan context.

5.6.2. Implications for Pedagogy

The following pedagogical implications emerged:

1. L2 teaching should begin only when students have developed their L1 proficiency. This claim is not only based on the findings of this study, but also on Cummins' developmental interdependence hypothesis. It is suggested that adequate and sufficient instruction in one language will make it possible to transfer the sub-skills to another language. Before school entry, students may have not been exposed to L1 in print to any great extent. Accordingly, early graders may not have yet developed their certain cognitive-linguistic dimensions. The priority of early schooling should, therefore, be the development of L1.

L2-medium instruction should be given only after students have cognitively developed their L1 proficiency.

2. L2-medium instructional time should be gradually increased after students are reasonably familiar with it. Students in the country which uses English as a foreign language may not encounter much English outside school, making the classroom the main space for them to learn L2. Students should not be expected to follow L2-medium classes immediately after they enter school. This study suggests that early and intensive exposure to L2 may impede students' development of L1 and negatively influence of L2 learning.
3. L2-only policy should not be the best practice for early graders in a country, specially where L2 is a foreign language. The affective engagement of the children in the classroom transactional processes and learning will be significantly higher when their language and everyday knowledge are used as classroom resources. One approach to this issue is encouraging collaboration between local teachers and English-speaking teachers in English-medium classes. For example, English-speaking teachers may be the main resource for providing students with good models of English language use with help from the local teachers to overcoming any language- or culture-related barriers.
4. Content-based L2 literacy requires special attention. Schools need to be aware that the linguistic and metalinguistic abilities needed for content-based subjects are different from those required for language courses. In such a scenario, special attention to help students acquire proficiency in maths is needed, including gaining familiarity with L2 vocabulary in maths and further relating the L2 maths vocabulary to the ideas they have learnt in L1. This may effectively help students prepare for L2-medium maths classes.

5.6.3. Implications for Research

The following implications for research emerged:

1. Different bilingual models and educational settings are believed to generate different learning outcomes. Successful bilingual programmes referenced in previous studies mostly were in settings that had two balanced languages. This is different from a setting where the target language is a foreign language. The bilingual school under this study does not function as well as expected. The

major factors contributing to this result may lie in the misconception that an L2-only pedagogical practice for teaching a foreign language to the early graders brings the most advantages in L2 learning if it is taught by the native English speaking teachers and is taught from class 1. Therefore, in order to help them benefit from bilingualism, it becomes necessary to take into consideration the place the target language occupies in the social context before setting pedagogical practices, including decisions like when should L2 classes start and the mutual intelligibility between the Taiwan students and the L2 teachers.

2. The classroom is a complex social system (Cazden 2001). Students' learning habits are different in different cultures. It is needed to take social-cultural context into consideration when copying models of bilingual education. While bilingual education models can be used as broad frameworks, it is also needed that the suitable pedagogical practices are designed to meet the needs of students in different countries.
3. In most research focusing on bilingual programmes, the teachers teaching L2 know the students' L1 in spite of having an L2-only policy (Roberts 1995). However, in the bilingual school observed in this study, the English-speaking teachers generally came from countries like UK, Australia, South Africa or America who did not know or knew very little of the students' L1 (mandarin Chinese) and their culture. As a result, L2 failed to obtain any linguistic or cultural scaffolds. On the contrary, it discouraged students from active participation in classroom transactions. As a result, the 'L2-only' approach got reduced to a non-participant, non-reflexive and top-down pedagogic approach in these schools. The lack of reflexivity was observed in the bilingual school's immense failure in analysing the students' poor performance in mathematics despite investing double the teaching time in mathematics class.

5.7 Contributions of the Study

Contribution to Bilingual Education Practice in Taiwan

This study is the first of its kind to be undertaken in Taiwan that provides a comprehensive and an analytical picture of a bilingual English teaching to native English speakers from other countries, immersing children in English only class and teaching non-language subjects in English as well from class 1. This provides critical

insights into the disadvantages of reduced emphasis on L1 learning. These findings were contrary to the popular beliefs about the superiority of the bilingual schools in English learning. In fact, the bilingual school students did not outperform their counterparts from the regular school either in L1, L2 or in mathematics. This goes against the stated principles of the bilingual school: first, to provide a greater exposure to L2 that will have direct link with students' acquisition of L2 skills; and second, L2-only classroom practice will result in the best outcomes of L2 learning. The study calls into question the advantage and the value of having unmediated L2-only language classes and L2-medium content-based education from class 1 for students' learning. This study has rather identified several obstacles experienced by students in an L2-medium maths class. The regular schools rather performed better than the bilingual schools. The findings call for bilingual schools to critically examine the efficacy of their existing language curriculum and syllabus and also to question the L2-only approach. The cognitive and learning advantage of the L1 based L2 approach practiced in the regular schools needs to be shared both with the parents and with the bilingual school promoters in Taiwan.

Contribution to Research

This study has extended the current literature by shedding light on Taiwan's bilingual school system, which has seldom been investigated in literature. Studies on bilingual schools have previously been in a cultural context where the target language is used as an official or second language. This is very different from Taiwan, where English is treated as a foreign language. As a result, it is needed to reconsider a variety of important issues regarding when and how to start L2 instruction, the pace of L1 in L2 learning, and the value of L2-only instruction in content-based subjects when L2 is a foreign language. The social-cultural context also needs to be taken into consideration when borrowing models of bilingual education, especially in Asian countries like Taiwan, Japan and Korea, where L2 is a foreign language and where the classrooms are embedded with different psychological and learning dynamics compared to Western countries.

This study is the first to suggest that the use of a 'L1 mediated L2' approach works better than the 'L2-only' approach for teaching both languages including a foreign language. As discussed in Hypothesis 7, the English teachers in the regular

school sometimes adhered to an English-only policy, but they understand the L1 spoken by the students. Thus, communication takes place successfully between the teachers and students when L2 fails to establish an intersubjective plane between the teachers and the students. However, this was not the case in L2-medium classes in the bilingual school where communication almost every times breakdowns or doesn't take place. What rules is the teachers' monologue. It was found that having teachers with little or no knowledge of the native language and the culture of L2 learners has a significant negative effect on teacher–student communications as well as the students' learning.

5.8 Limitations

There are several limitations of this study that should be mentioned:

1. With much effort, only one bilingual school finally allowed me to conduct my research. Due to the limits set by the school, I was granted access to two classes of the third and sixth grades for quantitative and qualitative study. Deeper interaction with teachers and students was discouraged nor was video recording allowed. These conditions limited the amount and quality of data that could be gathered and analysed. Nonetheless, it was the first successful attempt to gather information on literacy practices and approaches implemented in a bilingual schools in Taiwan. Of course, 309 students of the third and sixth grades studying here cannot be viewed as representative of the total population in bilingual schools of Taiwan. Although this study was on a small scale and the richness of the data gathered was high and was adequate for the purposes of analysis.
2. The length of time spent in fieldwork may impact the result of the research (Denscombe 2003). Ideally, the time spent on each subject would have been longer for more stable sources. However, due to the granted permissions by the two schools, classroom observations for each subject was 10 class periods in the regular school and 8 in the bilingual school. In spite of this, I took maximum advantages of the time in each subject class to collect as much data as possible. In addition, this study provides a close analysis of how classes are conducted and sheds light on the approach of content-based instruction in general. Accordingly, the findings reflect the overall characteristics of regular and bilingual schools. The research questions were clearly answered and the goals of

this study were substantially achieved. The quality of this study was definitely not influenced by the comparatively shorter time length allowed.

3. This study focused on L1 and L2 proficiencies, and maths achievement by bilingual school students at third and sixth grade levels. The findings reflected short-term competence and achievement. However, the two research settings under this study offered the sixth grade as the top level of elementary school. It must be noted that the curriculums of the elementary level differs from those of the junior high level. Thus, the sixth grade was the level investigated in this study.

5.9 Future Suggestions

The findings of the current research raise a number of issues requiring further investigation:

1. Due to the lack of a national policy on bilingual programmes in Taiwan, each bilingual school has its own curricular and the pedagogical practices. As the findings of this study shows, the syllabus offered in the bilingual schoo had limited success in developing additive bilinguals. Clearly, the pedagogical practices did not meet the needs of the students. The language-in-education policy in this school has been problematic. Investigations in more bilingual schools in Taiwan are needed to study the possible contingent effects of such practices on students' development of L1 and L2, and their academic achievements in other content areas. A deeper reflection is required on issues like when to start L2 instruction in elementary schools and what is the relationship between instructional languages and the sociolinguistic context of the teachers and the students in Taiwan. In addition, policies need to be set up regarding the qualification and the cultural background of the English-speaking teachers. The classroom observation data casts doubt on if the L2 teachers in the bilingual school had any training that supports language learning across the curriculum. The qualifications of English-speaking teachers, including their professional backgrounds and experiences, need to be ascertained. All those who speak native English may not be qualified to teach young children either English or the content areas.
2. The findings of the present study do not support the L2 advantages that one

would expect from a bilingual school. In this study, L2 was seen to be evaluated by literacy performance only. It cannot be denied that English-only programmes may facilitate the learning of oral English faster than those in an L1-supported regular programme. Thus, in the bilingual school, it is reasonable to expect students to have better oral and listening abilities in L2. Further research may be needed to examine bilingual school students' oral and listening abilities in L2.

3. It may be argued that the negative effect of an L2-only policy adopted by the bilingual school would grow in strength in the longer term. It is also suggested that it takes five to seven years of exposure to acquire L2 language proficiency in academic subjects (Cummins 2001), possibly longer if students do not use L2 in their social life (Mitchell et al. 1999). Being a foreign language, students have few, if any, opportunities to practice it outside the school. A longitudinal investigation on the effects of bilingual schools on students' learning is needed. Additional research is needed to track students' development of linguistic and academic performance because of the high threshold a child has to reach in L1 to benefit from a bilingual programme.
4. An area for future investigation could be the socio-psychological developments of bilingual schoolchildren in Taiwan viv-a-vis the regular school children. Some studies have been done in non-Asian countries (for example, Baker 2000; Fishman 1991; Skutnabb-Kangas 2000). The studies of this kind will be very helpful for developing a better understanding of the specific challenges that the teachers and the students encounter while learning through English.

Bibliography

Abedi, J. and Lord, C. (2001). The language factor in mathematics tests. *Applied Measurement in Education*, 14(3), pp.219–34.

Abedi, J., Leon, S. and Mirocha, J. (2003). *Impact of student language background on contentbased performance: Analyses of extant data* (CSE Technical Report 603). Los Angeles: UCLA Center for the Study of Evaluation, National Center for Research on Evaluation, Standards, and Student Testing.

Aboudan, R. (2009). Laugh and learn: Humor and learning a second language. *International Journal of Arts and Sciences*, 3(3), pp.90–99.

Admiraal, W., Westhoff, G., & de Bot, K. (2006). Evaluation of bilingual secondary education in the Netherlands: Students' language proficiency in English. *Educational Research and Evaluation*, 12(1), pp.75-93.

Alt, M., Arizmendi, G. and Beal, C. (2014). The relationship between mathematics and language: Academic implications for children with specific language impairment and English language learners. *Language, Speech, and Hearing Services in Schools*, 45(1), pp.220–33.

Anderson, L.W. and Burns, R.B. (1989). *Research in classrooms: The study of teachers, teaching and instruction*. Oxford: Pergamon Press.

Agnihotri, R. K. (2007). Towards a pedagogical paradigm rooted in multilinguality. *International Journal of Multilingual Research, 1(2),* pp.79-88.

Agnihotri, R. K. (2009). Multilinguality and a new world order. In A.K. Mohanty, M. Panda, R. Phillipson and T. Skutnabb-Kangas (Eds.), *Multilingual education for social justice: Globalizing the local* (pp. 268-277). New Delhi: Orient Blackswan.

Arthur, J. (1996). Code switching and collusion: classroom interaction in Botswana primary schools. *Linguistics and Education*, 8, pp.17–33.

Atkinson, D. (1987). The mother tongue in the classroom: a neglected resource? *ELT Journal*, 41(4), pp.241–47.

——— (1993). Teaching in the target language: A problem in the current orthodoxy. *Language Learning Journal*, 8(1), pp.2–5.

Auerbach, E.R. (1993). Reexamining English only in the ESL classroom. *TESOL Quarterly*, 27(1), pp.9–32.

August, D.A., Calderon, M. and Carlo, M. (2002). *Transfer of skills from Spanish to English: A study of young learners*. Report for Practitioners, Parents and Policy Makers. Washington, DC: Center for Applied Linguistics. Last visit on July 18, 2014 from http://www.cal.org/acquiringliteracy/subprojects/Sub2_Final.pdf

Aukerman, M. (2007). A culpable CALP: Rethinking the conversational and academic language proficiency distinction in early literacy instruction. *Reading Teacher*, 60(7), pp.626–35.

Austin, J.L., & Howson, A.G. (1979). Language and Mathematical Education, *Educational Studies Math,*10, pp.161–197.

Baker, C. (1988). *Key issues in bilingualism and bilingual education*. Clevedon: Multilingual Matters.

——— (2006). *Foundations of bilingual education and bilingualism*. 4th ed. Bristol: Multilingual Matters.

Baker, K., and de Kanter, A. A. (1981). *Effectiveness of bilingual education: A review of the literature.* Washington, DC: Department of Education Office of Planning, Budget, and Evaluation.

Baker, S.C. and MacIntyre, P.D. (2000). The role of gender and immersion in communication and second language orientations. *Language Learning*, 50(2), pp.311–41.

Ball, A. and Lardner, T. (1997). Dispositions toward language: Teacher constructs of knowledge and the Ann Arbor Black English case. *College Composition and Communication*, 48(4), pp.469–85.

Bardovi-Harlig, K and Sprouse, R. A (2017). Negative Versus Positive Transfer. *The TESOL Encyclopedia of English Language Teaching*. Published Online: 7 MAR 2017. Last visit on 05 July 2017 from http://onlinelibrary.wiley.com/doi/10.1002/9781118784235.eelt0084/pdf

Bernardo, A.B.I. (1999). Overcoming obstacles to understanding and solving word problems in mathematics. *Educational Psychology*, 19(2), pp.149–163.

——— (2002). Language and mathematical problem solving among bilinguals. *Journal of Psychology*, 136, pp.283–297.

Berry, J.W. (1997). Immigration, acculturation, and adaptation. *Applied Psychology*, 46(1), pp.5-34.

Berthold, M.J. (1992) An Australian experiment in French immersion. *Canadian Modern Language Review,* 49, pp.112–26.

Bhabha, H. (1994). *The location of culture*. London: Routledge.

Biggs, J. B. (1996). Western misperceptions of the Confucian-heritage learning culture. In D.A. Watkins and J.B. Biggs (Eds.), *The Chinese learner: Cultural, psychological and contextual influences* (pp. 45-67). Hong Kong: CERC and ACER.

Blair, R.W. (1991). *Innovative approaches: Teaching English as a second or foreign language*. 2nd edition. Boston: Heinle & Heinle.

Brown, H.D. (2000). *Principles of language learning and teaching*. New York: Longman.

Boothe, D., & West, J. (2015, July). English language learning through music and song lyrics–the performance of a lifetime. In *Conference Proceedings. The Future of Education* (pp. 248). Last visit on 25 November 2015 from https://conference.pixel-online.net/FOE/files/foe/ed0005/FP/0475-ITL949-FP-FOE5.pdf

Borich, G.D. (1994). *Observation skills for effective teaching*. New York: Macmillan.

Bourassa, D.C., Treiman, R. and Kessler, B. (2006). Use of morphology in spelling by children with dyslexia and typically developing children. *Memory & Cognition*, 34(3), pp.703–14.

Briar, D.J. and Larkin, J.H. (1984). An integrated model of skill in solving elementary word problems. *Cognition and Instruction*, 1, pp.245–96.

Brophy, J.E. (1987). Synthesis of research on strategies for motivation students to learn. *Education leadership*, 45, pp.40–48.

Burns, E. (2006). Pause, prompt and praise: Peer tutored reading fro pupils with learning difficulties. *British Journal of Special Education*, 33(2), pp.62–67.

Bylund, E., Abrahamsson, N. and Hyltenstam, K. (2012). Does first language maintenance hamper native likeness in a second language? *Studies in Second Language Acquisition*, 34(2), pp.215–41.

Cai, L. W. (2002). Wai ji jiaoshi de jiao wue yu guan li (A study of foreign teachers' teaching and management), *Cave English Teaching*, 35, pp. 50-54

Cameron, L. (2001). *Teaching languages to young learners.* Cambridge: CambridgeUniversity Press.

Capps, L.R. and Pickreign, J. (1993). Language connections in mathematics: A critical part of mathematics instruction. *Arithmetic Teacher*, 41(1), pp.8–12.

Cardenas-Hagan, E.,Carlson, C. D. and Pollard-Durodola, S. D. (2007). The cross-linguistic transfer of early literacy skills: The role of initial L1 and L2 skills and language of instruction. *Language, Speech, and Hearing Services in Schools*, 38(July), pp.249–59.

Carlisle, J.F. and Beeman, M.M. (2000). The effects of language of instruction on the reading and writing achievement of first-grade Hispanic children. *Scientific Studies of Reading*, 4(4), pp.331–53.

Carpenter, T.P., Corbitt, M.K., Kepner, H.S., Jr., Linquist, M.M. and Reys, R.E. (1980). Solving verbal problems: Results and implications from national assessment. *Arithmetic Teacher*, 28(1), pp.8–12.

Cazden, C.B. (2001). Variations in lesson structure. In *Classroom discourse: The Language of teaching and learning*. (2nd edition). Portsmouth: Heinemann, pp.53–68.

Çetin, Y., & Flamand, L. (2012). Posters, self-directed learning, and L2 vocabulary acquisition. *ELT Journal*, *67*(1), 52-61.

Chan, Y.-C.D. and Wu, G.-C. (2000). A study of foreign language anxiety of elementary school EFL leaners in Taiwan. In *Proceedings of the 2000 National Taipei Teachers College Educational Academic Conference*. Taipei: National Taipei Teachers College, pp.85–100.

Chang, S. and Lin, F. (2005). *Incorporation of communities with schools to promote Hakka Language.* Council for Hakka Affairs, Executive Yuan of Taiwan.

Chang, S.F. and Huang, S.C. (1999). Taiwanese English learners' learning motivation and language learning strategies. In *Proceedings of the Sixteenth Conference on English Teaching and Learning in the Republic of China*. Taipei: The Crane Publishing Company, pp. 111–28.

Chang, S.J. (2003). *Wo De Hai Zih Bu Huei Jiang Jhong Wun (My child cannot speak Chinese)*. Taipei: Parenting Sources Press, Inc.

Chavez, M. (2006). Classroom-language use in teacher-led instruction and teachers' self-perceived roles. *IRAL, International Review of Applied Linguistics in Language Teaching*, 44(1), pp.49–102.

Chavez, L., & Amselle, J. (1997). Bilingual education theory and practice: Its effectiveness and parental opinions. National Association of Secondary School Principals. *NASSP Bulletin*, 81(586), pp.101-106. Last visit on 06 July 2013 from http://ezproxy.aus.edu/

Chen, A.-H. (2001). Balancing communicative language teaching and grammar in Taiwan. *Hsiuping Journal of Humanities and Social Sciences*, 1, pp. 13–24.

Chen, S.C. (2010). Multilingualism in Taiwan. *International Journal of Social Language*, 205, pp.79–104.

Chen, H. M. and Fong, J.J. (2000). Myth of Field Dependence/Independence in an ESL Cooperative Learning Classroom. In: *The 9th International Symposium English Teaching*. pp. 81-88

Cheng, Y.L. (2006). The influence of kindergarten English immersion programs on children's (3-7 years old) perceptions of their native language and culture: A case study. *English Teaching & Learning*, 30(4), pp.87–109.

Chiung, W.V.T (2001). Language attitudes toward written Taiwanese. *Journal of Multilingual and Multicultural Development*, 22(6), pp.502–23.

Chuang, L.L. (2004). You Zhi Yuan Shuang Yu Jiao Yu De Mi Si (Myth about preschool bilingual education). *Preschool Newsletter*, 22, pp.10–11.

Clarkson, P.C. (1992). Language and mathematics: A comparison of bilingual and monolingual students of mathematics. *Educational Studies in Mathematics*, 23(4), pp.417–29.

Collier. V.P. (1987). Age and rate of acquisition of second language for academic proposes, *TESOL Quarterly*, 21(4), pp.617–41.

Collier, V.P. and Thomas, W.P. (2004). The astounding effectiveness of dual language education for all. *NABE Journal of Research and Practice*, 2(1), pp.1–20.

Cook, V. (1998). *Linguistics and second language acquisition*. New York: St. Martin's Press

——— (1999). Going beyond the native speaker in language teaching. *TESOL Quarterly*, 33(2), pp.185–209.

——— (2003). *Effects of the L2 on the L1*. Clevedon: Multilingual Matters.

Chsudron, C. (1988). *Second language classrooms*. Cambridge: Cambridge University Press.

Clarkson, P.C. and P. Galbraith (1992) Bilingualism and mathematics learning: Another perspective. *Journal for Research in Mathematics Education*, 23(1): 34-44.

Collier, V. (1987) How long? A synthesis of research on academic achievement in a second language. *TESOL Quarterly, vol.* 23, no. 3,pp. 509-531.

Cocking, R. R., & Chipman, S. (1988). Math achievement of language minorities. In R. R. Cocking & J. P. Mestre (Eds.), *Linguistic and cultural influences on learning mathematics* (pp. 17-46). Hillsdale, NJ: Erlbaum.

Creton, H., Wubbles, T. and Hooymayers, H. (1993). A system perspective on classroom. In H. Wubbles and J. Levy (Eds.), *Do you know what you look like?* (pp. 1-13). Hong Kong: Falmer Press..

Cuevas, G.J. (1984). Mathematics learning in English as a second language. *Journal for Research in Mathematics Education*, 15(2), pp.134–44.

Cummins, D.D., Kintsch,W., Reusser, K. and Weimer, R. (1988). The role of understanding in solving word problems. *Cognitive Psychology*, 20, pp.405–38.

Cummins, J. (1979). Linguistic interdependence and the educational development of bilingual children. *Review of Educational Research*, 49(2), 222–251.

——— (1980). The cross-lingual dimensions of language proficiency: Implication for bilingual education and the optimal age issue. *TESOL Quarterly*,14(2), pp.175–87.

——— (1981). Empirical and theoretical underpinnings of bilingual education. *Journal of Education*, 163(1), pp.16–29.

——— (1984) *Bilingual Education and Special Education: Issues in Assessment and Pedagogy* San Diego: College Hill

——— (1991) Language Development and Academic Learning. In Malave, L. and Duquette, G.(Eds.), *Language, Culture and Cognition* (pp. 161–175). Clevedon: Multilingual Matter.

———Cummins, J. (1994) The Acquisition of English as a Second Language, In Spangenberg-Urbschat, K. and Pritchard, R. (eds), Kids come in all languages: *Reading Instruction for ESL Students (pp. 36-62). Newwark, DE:* International Reading Association.

——— (1999). Alternative paradigms in bilingual education research: Does theory have a place? *Educational Researcher*, 28(7), pp.26–32, 41.

———Cummins, J. (2000) *Language, Power and Pedgogy: Bilingual Children in the Crossfire.* Clevedon: Multilingual Matters

——— (2001). Bilingual children's mother tongue: Why is it important for education? *Sprogforum* 7(19), pp.15–20.

——— (2008). BICS and CALP: Empirical and theoretical status of the distinction. In B. Street and N.H. Hornberger (Eds.), *Encyclopedia of language and education* (pp. 71-83), Vol.2: Literacy. 2nd edition. New York: Springer Science.

Cummins, J. and McNeely, S. (1987) Language Development, Academic Learning, and Empowering Minority Students. In Tikunoff, K. (Ed.),*Bilingual Education and Bilingual Special Education: A Guide for Administrators* (pp. 75-94).Boston: College Hill.

Cumming-Potvin, W., Renshaw, P., & van Kraayenoord, C. (2003). Scaffolding and bilingual shared reading experiences: Promoting primary school students' learning and development. *Australian Journal of Language and Literacy*, 26(2), pp.54-68.

Dawe, L. (1983). Bilingualism and mathematical reasoning in English as a second language. *Educational Studies in Mathematics*, 14 (4), pp.325–53.

Deacon, S.H., Wade-Woolley, L. and Kirby, J. (2007). Crossover: The role of morphological awareness in French immersion children's reading. *Developmental Psychology*, 43(3), pp.732–46.

Dekeyser, R. (1994). Implicit and explicit learning of L2 grammar: A pilot study. *TESOL Quarterly*, 28(1), pp.188-194.

Denscombe, M. (2003). The good research guide : for small-scale social research projects, 2nd edition, Maidenhead. Open University Press

Dexter, A.L., Lavigne, A.L. and de la Garza, T.O. (2016) Communicating care across culture and language: The student–teacher relationship as a site of socialization in public schools. *Humanity and Society*, 40, pp.155–79.

Chang, F.Y. (2011). The Causes of Learners' Reticence and Passivity in English Classrooms in Taiwan. *The Journal of ASIA TEFL*.8(1), pp. 1-22.

De Courcy, M. and Burston, M. (2000) Learning mathematics through French in Australia. *Language and Education*, 14(1). pp.58-78

de Jabrun,P.L.M. d'Eimar (1997)Academic achievement in late partial immersion French. *Babel* 32 (2), pp.20–23.

Evans, M. and Fisher, L. (2005).Measuring gains in pupils' foreign language competence as a result of participation in a school exchange visit: the case of Y9 pupils at three comprehensive schools in the UK, *Language Teaching Research*, 9 (2),pp.173-192.

Dulay, H., Burt, M.K. and Krashen, S. (1982). *Language two*. New York: Oxford University Press.

Dutcher, N. (1995) The Use of First and Second Languages in Education. A Review of International Experience. *Pacific Island Discussion Paper Series No.1*. Washington DC: World Bank.

Duyck, W. and Warlop, N. (2009). Translation priming between the native language and a second language: New evidence from Dutch-French bilinguals. *Experimental Psychology*, 56(3),pp.173–79.

Eccles, J.S. (1999). The development of children ages 6–14. *Future of Children*, 9, pp.30–44.

Ellis, R. (1994). *The study of second language acquisition.* Oxford: Oxford University Press.

——— (2003). *Task-based language learning and teaching*. Oxford: Oxford University Press.

Elwell, W.C. & Tiberio, J. (1994). Teacher praise. *Journal of Instructional Psychology*, 21, pp.322–328.

Ernst-Slavit, G. (1997). Different words, different worlds: Language use, power, and authorized language in a bilingual classroom. *Linguistics and Education*, 9, pp.25–48.

Evertson, C.M., Emmer, E.T. and Worsham, M.E. (2003). *Classroom management for elementary teachers*. 6th edition. Boston: Allyn and Bacon.

Faltis, C. and Hudelson, S. (1994). Learning English as an additional language in K-12 schools. *TESOL Quarterly*, 28(3), pp.457–68.

Fat, M. (2004). *Problems faced by Chinese learners in L2 English learning and pedagogic recommendations from an inter-cultural communication perspective*. Last visit on 14 August 2014 from http://www3.telus.net/linguisticsissues/problemschinese.html

Firth, A., & Wagner, J. (1997). On discourse, communication, and (some) fundamental conceps in SLA Research. *Modern Language Journal*, 81, pp.285-300.

Fisher, J. (1996) *Starting from the Child?* Buckingham: Open University Press

Flores, B.B. and H.L. Smith (2009). Teachers' characteristics and attitudinal beliefs about linguistic and cultural diversity. *Bilingual Research Journal*, 31(1–2), pp.323–58.

Freudenstein, R. (1991). Europe after 1992. Chances and problems for the less commonly taught language. *FIPLV World News, 55*(21), pp.1-3.

Gabrielatos C. (2001). L1 use in ELT: Not a skeleton, but a bone of contention.

Bridges, 6, pp.33–35.

Garcia, P. A. (2001). A French immersion charter school: Kansas City's Academie Lafayette. The ACIE Newsletter, 4(20). Last visit on April 25, 2016 from http://carla.umn.edu/immersion/acie/vol4/Feb2001_KansasFrench.html

García, O., Johnson, S. & Seltzer, K. (2017). *The Translanguaging classroom. Leveraging student bilingualism for learning.* Philadelphia: Caslon.

Garcia, O. (2009). *Bilingual education in the 21st century: A global perspective*. Singapore: Fabulous.

Garcia-Vazquez, E., Vazquez, L.A., Lopez, I.C. and Ward, W. (1997). Language proficiency and academic success: Relationships between proficiency in two languages and achievement among Mexican American students. *Bilingual Research Journal*, 21(4), pp.395–439.

Carson, J., Carrell, P., Silberstein, S., Kroll, B., & Kuehn, P. (1990). Reading-writing relationships in first and second language. *TESOL Quarterly*, 24, pp.245-266

Gass, S. (1997). *Input, interaction, and the second language learner*. Mahwah, NJ: Lawrence Erlbaum Associates.

Gathercole, V. C. M., Thomas, E. M., Hughes, E. K. (2008). Designing a normed receptive vocabulary test for bilingual populations: A model from Welsh. International Journal of Bilingual Education and Bilingualism, 11(6), 678–720

Genesee, F. (1987). *Learning through two languages*. Booston: Heinle & Heinle Publishers.

———(1979). Acquisition of reading skills in immersion programs. *Foreign Language Annals*, 12, pp. 71–77.

Genesee, F. and Lindholm-Leary, K. (2013). Two case studies of content-based language education. Journal of Immersion and Content-Based Language Education,1:1. pp. 3–33.

Gfeller, E. and Robinson, C. (1998). Which language for teaching? The cultural messages transmitted by the languages used in education. *Language and Education*, 12(1), pp.18–32.

Gillon, G.T. (2004). *Phonological awareness: From research to practice*. New York: Guilford Press

Good, T.L. and Brophy, J. E. (2000). *Looking in Classrooms*, 8th edition. New York: Longman.

Greene, J. (1998). *A meta-analysis of the effectiveness of bilingual education*. Claremont, CA: Tomas Rivera Policy Institute.

Grubbs, N. and Boes, S.R. (2009). An action research study of the effectiveness of the peer tutoring program at one suburban middle school. *Georgia School Counselors Association Journal*, 16(1), pp.21–31.

Grudgeon, E., Hubbard, L., Smith, C. and Dawes, L. (1998) *Teaching speaking and listening in the primary school*. London: David Fulton.

Gu, Q. (2005). Intercultural experience and teacher professional development. *RELC Journal*, 36(1), pp.5–22.

Guglielmi, R.S. (2008). Native language proficiency, English literacy, academic achievement, and occupational attainment in limited-English-proficient students: a latent growth modeling perspective. *Journal of Educational Psychology*, 100(2), pp.322–42.

Hadley, A.O. (2001). *Teaching language in context.* Boston: Heinle & Heinle.

Hadley, H. (2001). Power distance: Implications for English language teaching. Niigata University of International and Information Studies. Last visit on May 15, 2014 from http://www.nuis.ac.jp/~hadley/publication/ powerdistance/hadpower.htm

Hall, J.K. (1993). The role of oral practices in the accomplishment of our everyday lives: The sociocultural dimension of interaction with implications for the learning of another language. *Applied Linguistics*, 14(2), pp.145–66.

Hamilton, K. and Krashen, S. (2006). Bilingual or immersion? *Diverse Issues in Higher Education*, 23(5), pp.23–26.

Hamre, B. K., & Pianta, R. C. (2001). Early teacher–child relationships and the trajectory of children's school outcomes through eighth grade. *Child Development*, 72(2), pp.625-638.

Han, W.-J. (2012), Bilingualism and academic achievement. *Child Development*, 83(1), pp.300–21.

Han. Y. and Ginsburg, H. P. (2001). Chinese and English Mathematics Language: The Relation between Linguistic Clarity and Mathematical Performance, *Mathematical Thinking and Learning*, 3, pp.201-220

Harbord, J. (1992). The use of the mother tongue in the classroom. *ELT Journal*, 46(4), pp.350–55.

Helgesen, M. and Brown, S. (1994). *Active listening: Building skills for understanding*. Melbourne: Cambridge University Press.

Hirschy, A. S., & Wilson, M. E. (2002). The sociology of the classroom and its influence on student learning. *Peabody Journal of Education*, 77 (3), pp.85–100.

Ho Fong, W.K. and Van Naerssen, M. (1986) Teaching English through English and through English and Chinese in Hong Kong Form l remedial English classrooms. *Educational Research Journal*, l, pp.28–34.

Hoffman, C. (1991). *Introduction to Bilingualism*. New York: Longman

Hofstede, G. 1986. Cultural differences in teaching and learning. *International Journal of Intercultural Relations*, 10, pp.301–20.

Holland, W.R. (1960). Language barrier as an educational problem of Spanish-speaking children. *Exceptional Children*, 27, pp.42–50.

Holliday, A.(1996). Large-and small-class cultures in Egyptian university classrooms: A cultural justification for curriculum change. In H. Coleman (Ed.), *Society and the Language Classroom* (pp.86–104). Cambridge: Cambridge University Press

——— 1999. Small cultures. *Applied Linguistics*, 20(2), pp.237–64.

Honna, N. and Takeshita, Y. (2005). English language teaching in Japan: Policy plans and their implementations. *RELC Journal*, 36(3), pp.363–83.

Horasan, S. (2014). Code-switching in EFL classrooms and the perceptions of the students and teachers. *Journal of Language and Linguistic Studies*, 10(1), pp.31–45.

Horwitz, E. K., Horwitz, M. B., and Cope, J. (*1986*). *Foreign language classroom anxiety*. The Modern Language Journal, 70(2), 125-132.

Howard, E. R., & Christian, D. (2002). Two-way immersion 101: Designing and implementing a two-way immersion education program at the elementary level .Educational Practice Report No. 9. Santa Cruz, CA: Center for Research on Education, Diversity, and Excellence, University of California-Santa Cruz. Last visit on April 18, 2014 from http://www.cal.org/twi/pdfs/two-way-immersion-101.pdf

Huang, S. (1991). *Language, society, and ethnic identity*. Taipei: Crane.

Ho, D.G.E. (2005). Why do teachers ask questions they ask? *RELC Journal*, 36(3), pp.297–310.

Hymes, D.H. (1972). On Communicative Competenc. In J.B. Pride and J. Holmes (Eds.). *Sociolinguistics*: *Selected Readings* (pp. 269-293).Harmondsworth: Penguin,

Jacobson, R., & Faltis, C. (1990). *Language distribution issues in bilingual schooling*. Clevedon, UK: Multilingual Matters.

Jheng, H. F. (2004). wai ji jiao shi zei miao li dan ren ying yu liao xue zhi yan jiu (A study of English teaching of foreign teachers in Miaoli (Taiwan).). MA dissertation, Department of Education, National Taipei University of Education, Taipei (unpublished)

Jones, P. L. (1982). Learning mathematics in a second language: A problem with more and less. *Educational Studies in Mathematics*, 13, pp.267-87.

Johnson, R.K. (1991). Teaching and learning in the English stream in secondary schools: Implications of ECR4. *Institute of Language in Education Journal*, 8, pp.l0–24

——— (1995). *Critical review of literature on language in education in Hong Kong*. In ECR6 Draft, Annex. Hong Kong: Government Printer, Hong Kong, pp. 5–25.

Jun Liu (2002) Negotiating silence in American classrooms: Three Chinese cases, *Language and Intercultural Communication*, 2(1), pp.37–54.

Kachru, B.B. (1986). *The alchemy of English*. Oxford: Pergamon Press.

Kamatchi, P. (2017) Socio-Economic Factors in English Language Teaching. *International Journal of English Language, Literature and Translation Studies* (IJELR).April-June, 4 (2), pp. 75-80.

Kirkpatrick, A. (2010). *English as a lingua franca in ASEAN: A multilingual model*. Hong Kong: Hong Kong University Press.

Kramsch, C. (1993). *Context and culture in language teaching.* Oxford: Oxford University Press.

Krashen, S.D. (1981). Bilingual education and second language acquisition theory. In D.P. Dolson (Ed.) *Schooling and language minority students: a theoretical framework.* Los Angeles, CA: Evaluation, Dissemination and Assessment Center.

——— (1981). *Second Language Acquisition and Second Language Learning.* Oxford: Pergamon.

——— (1982). *Principles and Practice in Second Language Acquisition.* Oxford: Pergamon.

Lambert, W.E. (1983). Deciding on languages of instruction: psychological and social considerations. In Husen, T. & Opper, S. (eds.). *Multicultural and Multilingual*

Education in Immigrant Countries (pp. 93-104). Oxford: Pergamon Press.

———(1992). Challenging established views on social issues: The power and limitations of research. *American Psychologist*, 47, pp.533–42.

Lantolf, J. (2006). *Sociocultural theory and L2.* Cambridge: Cambridge University Press.

Lee, C. (2006). *Language for learning mathematics.* Maidenhead, England: Open University Press.

Lefebvre, C., White, L. and Jourdan, C. (2006). *L2 acquisition and Creole genesis*. Amsterd, Dam and Philadelphia: John Benjamins.

Li, M., Kirby, J.R., Cheng, L., Wade-Woolley, L. and Qiang, H. (2012). Cognitive predictors of English reading achievement in Chinese English-immersion students. *Reading Psychology*, 33, pp.423–47.

Li, Wei (1993) Mother tongue maintenance in a Chinese community school in Newcastle Upon Tyne: developing a social network perspective. *Language and Education* 7 (3), pp. 199-215.

Leow, R. P. (1998). The effects of amount and type of exposure on adult learners' L2 development in SLA. *Modern Language Journal*, 82, pp.49-68.

Levine, G.S. (2003). Student and instructor beliefs and attitudes about target language use, first language use, and anxiety: Report of a questionnaire study. *Modern Language Journal*, 87, pp.343–64.

——— (2013). The case for a multilingual approach to language classroom communication. Language and Linguistics Compass,7, p. 423–436.

Liao, Y.-F. (1999). The effects of anxiety on Taiwanese EFL learners. In: *The Proceedings of the Eighth International Symposium on English Teaching*. Taipei: The Crane Publishing Company, pp.453–63.

Lightbown, P.M. (1985). Acquisition research and classroom teaching. *Applied Linguistics*, 6(2), pp.173–89.

Lightbown, P.M. and Spada, N.(2006). *How language are learned*. Oxford: Oxford University Press, USA

Lin, A.M.Y. (1996). Bilingualism or linguistic segregation? Symbolic domination,

resistance and code switching in Hong Kong schools. *Linguistics and Education*, 8, pp.49–84.

Lin, P.-Y.(2011). *Teacher questioning and classroom participation in two Taiwanese junior high school English classrooms*. M.A. dissertation, Department of Foreign Language and Literature, Taiwan.

Lin, Y.W. and Yang, W.W. (2003). They speak more English than Mandarin. *Business Weekly*, 804, pp.104–9.

Lindholm, K.J. (1990). Bilingual immersion education: Criteria for program development. In A.M. Padilla, H.H. Fairchild and C.M. Valadez (Eds.), *Bilingual education: Issues and strategies (*pp. 91–103), Thousand Oaks: Sage Publications, Inc.,

Llinares-Garcia, A. (2005).The effect of teacher feedback on EFL learners' functional production in classroom discourse. Anglogermanica Online. Last visit on August 5, 2013 from: http://www.uv.es/anglogermanica/2005/Llinares.htm

Long, M. H. (1996). The role of the linguistic environment in second language acquisition. In T. Bhatia and W. Ritchie (Eds.), *Handbook of second language acquisition* (pp.413-468), (2nd edition). New York: Academic

———(1990). Maturational constraints on language development. *Studies in Second Language Acquisition*, 12(03), pp.251-285.

Luke, K. K. (1992) *Into the twenty first century: Issues of language in education in Hong Kong*. Hong Kong: Linguistic Society of Hong Kong.

MacGregor, M. & Price, E. (1999). An exploration of aspects of language proficiency and algebra learning. *Journal for Research in Mathematics Education*, 30(4), pp.449 –467.

MacIntyre, P. D. (1995). How Does Anxiety Affect Second Language Learning? A Reply to Sparks and Ganschow. *Modern Language Journal*, (79)1. pp.90-99.

MacIntyre, P.D. and Charos, C. (1996). Personality, attitudes, and affect as predictors of second language communication. *Journal of Language and Social Psychology*, 15(1), pp.3–26.

MacIntyre, P.D. and Gardner, R.C. (1991). Language anxiety: Its relationship to other anxieties and to processing in native and second languages. *Language Learning*,

41(4), pp.513–34.

Magid, A., El Mamoun, M. and Mugaddam, A. H. (2013). Code Switching as an Interactive Tool in ESL Classrooms. *English Linguistics Research (*Online Published: August 19, 2013*)*. 2 (2), p.31-42. Last visit on May 20, 2017 from https://www.researchgate.net/publication/259198900_Code_Switching_as_an_Interactive_Tool_in_ESL_Classrooms

Mahboob, A., Uhrig, K., Newman, K. and Hartford, B. S. (2004). Children of a lesser English: Status of nonnative English speakers as college-level English as a second language teachers in the United States. In L. Kamhi-Stein (Ed.), *Learning and teaching from experience: Perspectives on nonnative Englishspeaking professionals*(pp. 100-120). Ann Arbor: University of Michigan Press.

Makulloluwa, E. (2013). Code-switching by the teachers in the second language classroom. *International Journal of Arts & Sciences*, 6 (3), pp. 581-598.

Mantero, M. (2002). Bridging the gap: Discourse in text-based foreign language classrooms. *Foreign Language Annals*, 35(4), pp. 437–56.

Marian,V.,Shook,A.and Schroeder S.R.(2013) Bilingual Two-Way Immersion Programs benefit Academic Achievement. *Bilingual Research Journal,* 36,pp.167–186.

Martiniello, M. (2008) Language and the Performance of English-Language Learners in Math Word Problems. *Harvard Educational Review:* July 2008, 78 (2), pp. 333-368.

Marsh, H.W., Hau, K.T. and Kong, C.K. (2000). Late immersion and language of instruction (English vs Chinese) in Hong Kong high schools: Achievement growth in language and nonlanguage subjects. *Harvard Educational Review*, 70, pp.302–46.

——— (2002). Multilevel causal ordering of academic self-concept and achievement: Influence of Language of instruction (English compared with Chinese) for Hong Kong studies. *American Educational Research Journal*, 39(3), pp.727–63.

Martiniello, M. (2008). Language and the performance of English-language learners in math word problems. *Harvard Educational Review*, 78(2), pp.333–68.

Mazzocco, M.M. (2005). Challenges in identifying target skills for math disability screening and intervention. *Journal of Learning Disabilities*, 38(4), 318–23.

McKay, S.L. (2014). Commentary: English-medium education in the global society—Findings and implications. *IRAL*, 52(2), pp.221–28.

McLeod, S. A. (2007). Memory Encoding Storage and Retrieval. Last Visit on March 22, 2013 from http://www.simplypsychology.org/memory.html

Merritt, M., Ailie, C., Abagi, J.O. and Bunyi, G. (1992). Socialising multilingualism: Determinants of codeswitching in Kenyan primary classrooms. *Journal of Multilingual and Multicultural Development*, 13(1–2), pp.103–21.

Meschyan, G. and Hernandez, A. (2002). Is native-language decoding skill related to second-language learning? *Journal of Educational Psychology*, 94(1), pp.14–22.

Met, M. (1991). Learning language through content: Learning content through language. *Foreign Language Annals*, 24(4), pp.281–95.

Medgyes, P. (1992). Native or non-native: Who's worth more? *ELT Journal,* 46(4), pp.340–49.

Mohanty, A.K. (2009). Multilingual education: A bridge too far? In A.K. Mohanty, M. Panda, R. Phillipson and T. Skutnabb-Kangas (Eds.), *Multilingual education for social justice: Globalising the local (pp. 5-19)*. New Delhi: Orient Blackswan.

———. (2006). Multilingualism of the unequals and predicaments of education in India: Mother tongue or other tongue? In O. Garcia, T. Skutnabb-Kangas and M.E. Torres-Guzman (Eds.), *Imagining multilingual schools: Languages in education and glocalization* (pp. 262-283). Clevedon: Multilingual Matters.

Mohanty, A.K. and Perregaux, C.(1997). Language acquisition and bilingualism. In J.W. Berry, P.R. Dasen and T. S. Saraswathi (Eds.), *Handbook of cross-cultural psychology, Vol.2: Basic processes and human development* (pp.217–54). Boston MA: Allyn and Bacon,

Monaghan, J. (1991). Problems with the language of limits. *For the Learning of Mathematics,* 11(2), pp.20-24.

Moore, D. (2002). Case study: CS and learning in the classroom. *International Journal of Bilingual Education and Bilingualism*, 5,pp.279–93.

Monroe, E.E. and Orme, M.P. (2002). Developing mathematical vocabulary. *Preventing School Failure: Alternative Education for Children and Youth,* 46(3), pp.139–42.

Mora, J.K. (2001). Learning to spell in two languages: Orthographic transfer in a transitional Spanish/English bilingual program. In P. Dreyer (Ed.), *Raising Scores, Raising Questions: Claremont Reading Conference 65th Yearbook* (pp.64–84). Claremont, CA: Claremont Graduate University.

Mouw, T. and Xie, Y. (1999). Bilingualism and the academic achievement of first- and second-generation Asian Americans: Accommodation with or without Assimilation? *American Sociological Review*, 64(2), pp.232–52.

Nelson, L., 1995. Cultural differences in learning styles. *International Journal of Behaviour Development*, 28(1), pp.26–36.

Netten, J. & Germain, C. (2002). Transdisciplinary approach and intensity in second language learning/teaching. *Canadian Journal of Applied Linguistics*

Nien, H.Y. (2001). *A study of English teaching in a kindergarten: an example of a bilingual class in north Taiwan*. M.A. dissertation, Department of Education, Taipei Municipal Teachers College, Taipei.

Nikula, T. (2005) English as an object and tool of study in classrooms: Interactional effects and pragmatic implications. *Linguistics and Education*, 16 (1), 27-58.

Nunan, D. (2003) The impact of English as a global language on educational policies and practice in Asia-pacific region. *TESOL Quarterly*, 37(4), pp.589–613.

Ohta, A.S. (2001). *Second language acquisition processes in the classroom.* Mahwah, NJ: Lawrence Erlbaum.

Oladejo, J. (2006). Parents' attitudes towards bilingual education policy in Taiwan. *Bilingual Research Journal*, 30(1), pp. 147–38.

Opie, I. and Opie, P. (2000). *The lore and language of schoolchildren*. New York: NYRB Classics.

Pacek, D. (2005). Personality not nationality: Foreign students' perceptions of a non-native speaker lecturer of English at a British university. In E. Llurda (Ed.), *Nonnative language teachers: Perceptions, challenges and contributions to the profession* (pp.243–61). New York: Springer

Pacific Policy Research Cente (August 2010). *Successful Bilingual and Immersion Education Models/Programs*. Kamehameha Schools Research & Evaluation

Division. Last Visit on 08 January 2014 from http://www.ksbe.edu/_assets/spi/pdfs/Bilingual_Immersion_full.pdf

Panda, M., Mohanty, A K., Skutnabb-Kangas, T. and Phillipson, R. (2009). *Multilingual Education for Social Justice: Globalising the Local*. New Delhi: Orient Blackswan.

Panda, M. (2012). 'Bridging' and 'exit' as two metaphors of multilingual education: A critique from a social constructionist perspective. *Psychological Studies*, 57(2), p.240-250.

———(2004). Culture and mathematics: A case study of Saoras (India). In K. Chanana (Ed.),*Tranformative links between higher and basic education: Mapping the field* (pp.190-206). Delhi: Sage.

Pandey, S (2006) Para-teacher scheme and quality education for all in India: Policy perspectives and challenges for school effectiveness. *Journal of Education for Teaching*, 32(3),pp.319–334.

Park, H.S. and Quinn, C.J. (2007). Impact of native language use on academic achievement within the context of family and school factor. *Research in the Schools*,14(2), pp.18–26.

Pease-Alvarez, L. and Hakuta, K.(1992). Enriching our views of bilingualism and bilingual education. *Educational Researcher*, 21(2), pp.4–6.

Phillipson, R. (1992). *Linguistic Imperialism. Oxford: Oxford University Press*

———. (1997). Realities and myths of linguistic imperialism. *Journal of Multilingual and Multicultural Development*, 18(3), pp.238–48.

———. (1988). Linguicism: Structures and ideologies in linguistic imperialism. In Skutnabb-Kangas, T. & Curnmins, J. (Eds.), Minority Education: From Shame to Struggle (pp.339-58). Oxford: Oxford University Press.

Pieterse, J.N. (1994). Globalization as hybridization. *International Sociology*, 9(2), pp.161–84.

Ramey CT, Ramey SL (1994). The Transition to School: Why the First Few Years Matter for a Lifetime. *Phi Delta Kappan*,76(30),pp.194-198.

Ramirez, G., Chen, X., Geva, E. and Kiefer, H. (2010). Morphological awareness in Spanish-speaking English language learners: Within and cross-language effects on

word reading. *Reading and Writing: An Interdisciplinary Journal*, 23(3–4), pp.337–58.

Reynolds, P.D. (1984) The language medium: Interrelated issues. *New Horizons*, 25, pp.66–73.

Rinnvolucri, M. (2001). Mother tongue in the foreign language classroom: why and how. *Modern Language Teacher, 10* (2),pp.41-44.

Roberts, J. (1998). *Language teacher education*. New York: Arnold.

Roberts, C. A.(1995). Bilingual education program models: A framework for understanding. *Bilingual Research Journal*, 19(3–4), pp.369–78.

Robinson, P. (1996). Learning simple and complex second language rules under implicit, incidental, rule-search, and instructed conditions. *Studies in Second Language Acquisition, 18*(1), pp.27-67.

Rolin-Ianziti, J., & Brownlie, S. (2002). Teacher use of the learners' native language in the foreign language classroom. *The Canadian Modern Language Review, 58*(3), pp.402-426.

Rohlen, T. P. (1983). Japan's high school. Berkeley: University of California Press

Ruan, B.S. (1996). You Er Ying Yu Ban Cheng Sing Sia De Sheng Sih (Thinking of the teaching of english to kids). *Guo Jiao Zhi You*, 48, pp.11–13.

Ruiz, R. (1984). Orientations in language planning. *NABE Journal for the National Association for Bilingual Education*, 8(2), pp.15–34.

Rutter, M. and Maughan, B. (2002). School effectiveness findings, 1979–2002. *Journal of School Psychology*, 40, pp.451–75.

Ryan, P.M. (1998). Cultural knowledge and foreign language teachers: A case study of a native speaker of English and a native speaker of Spanish. *Language, Culture and Curriculum*, 11, pp.135–53.

Sakurai, S. (2014). Corrective feedback and student uptakes in English immersion classrooms in Japan: Is the counter-balance hypothesis valid? *Electronic Journal for English as a Second Language*, 18(1). Last visit on April 7, 2017 from http://www.tesl-ej.org/wordpress/issues/volume18/ej69/ej69a1/

Sarama, J., & Clements, D. H. (2002). Building blocks for young children's

mathematical development. *Journal of Educational Computing Research*, 27 (1and 2),pp.93–110.

Scarcella, R., and Oxford, R. (1992). The tapestry of language learning: The individual in the communicative classroom. Boston, MA: Heinle & Heinle.

Schumann, J.H. (1978). The acculturation model for second-language acquisition. In R. Gingras (Ed.), *Second-language acquisition and foreign language teaching* (pp. 27–50). Arlington, VA: Center for Applied Linguistics,

Schumann, J. H. (1986). Research on the acculturation model for second language acquisition. *Journal of Multilingual and Multicultural Development,* 7, pp. 378-392.

Schweers, W. J. (1999). Using L1 in the L2 classroom. *English Teaching Forum*, 37(2), pp.6–9.

Scollon, R. and Scollon, S., 2001. *Intercultural communication*. Oxford: Blackwell.

Secada, W. (1992). Race, ethnicity, social class, language, and achievement in mathematics. In D. Grouws (Ed.). *Handbook of research on mathematics teaching and learning* (pp. 146-164). New York: Macmillian.

Sener, S., and Bostan, D. (2017). Using posters in EFL classroom: An elementary school case. *International Online Journal of Education and Teaching (IOJET),* 4(4), pp.552-560.

Senior, R. (2006) Class-centred teaching is successful teaching. *English Teaching Professional*, 46, pp.71.

Senior, R. (2001). The role of humour in the development and maintenance of class cohesion. *Prospect*, *16*(2), pp.45-54.

Setati, M. (1998). Code-switching in a senior primary class of second-language learners. *For the Learning of Mathematics*, 18(1), pp.34–40.

Setati, M. and Adler, J. (2000). Between languages and discourses: Language practices in primary multilingual mathematics classrooms in South Africa. *Educational Studies in Mathematics*, 43, pp.243–69.

Shores, R. E., Gunter, P. L., & Jack, S. L.(1993). Classroom management strategies: Are they setting events for coercion? *Behavioral Disorders*, 18 ,pp.92–102.

Short, D. (1997). Reading and writing and...social studies: Research on integrated language and content in secondary classrooms. In M. Snow & D. Brinton (Eds.), *The content-based clasCsroom: Perspectives on integrating language and content* (pp. 213-232). White Plains, NY: Longman.

Simon, D.L. (2001). Towards a new understanding of code switching in the foreign language classroom. In R. Jacobson (Ed.), *Code switching Worldwide II (*pp: 311-342). Berlin: Mouton de Gruyter.

Skutnabb-Kangas, T. (2000). Linguistic human rights in education? In O. Garcia and C. Baker, (Eds)., *Bilingual education: An introductory reader* (pp.137–44).Toronto: Multilingual Matters,

Snow, M.A. (1998). Trends and issues in content-based instruction. *Annual Review of Applied Linguistics*, 18, pp.243–67.

Sparks, R.L., Ganschow, L. and Patton, J. (1995). Prediction of performance in first-year foreign language courses: Connections between native and foreign language learning. *Journal of Educational Psychology*, 87(4), pp.638–55.

Sparks, R.L., Patton, J., Ganschow, L., Humbach, N. and Javorsky, J. (2006). Native language predictors of foreign language proficiency and foreign language aptitude. *Annals of Dyslexia*, 56(1), pp.129–60.

Stewart, J.H. (2005). Foreign language study in elementary schools: Benefits and implications for achievement in reading and math. *Early Childhood Education Journal*, 33(1), pp.11–16.

Stoller, F. (2004). Content-based instruction: Perspectives on curriculum planning. *Annual Review of Applied Linguistic*s, 24, pp.261–83.

Swain, M. (1984). A review of immersion education in Canada: Research and evaluation studies. In *Studies on immersion education: A collection for United States educators* (pp. 87–112). Sacramento: California State Department of Education.

———. (1985). Communicative competence: Some roles of comprehensible input and comprehensible output in its development. In S.M. Gass and C.G. Madden (Eds.), *Input in second language acquisition* (p.235-253). Rowley, MA: Newbury House.

——— (1986). Two ingredients to the successful use of a second language as amedium

of instruction in Hong Kong. *Educational Research Journal*, 1, pp.1–6.

Swain, M. and Lapkin, S. (1982). *Evaluating bilingual education: A Canadian case study*. Clevedon: Multilingual Matters.

Tabors, P.O., Páez, M.M. and López, L.M. (2003). Dual language abilities of Spanish–English bilingual four year olds: Initial finding from the early childhood study of language and literacy development of Spanish speaking children. *NABE Journal of Research and Practice*, 1, pp.70–91.

Tollefson, J.W. and Tsui, A.B.M. (2004). *Medium of instruction policies: Which agenda? Whose agenda?* Mahwah, NJ: Lawrence Erlbaum Associates.

Turnbull, M. (2001). There is a role for the L1 in second and foreign language teaching, but.... *Canadian Modern Language Review*, 57, pp.531–40.

Van-Dijk, D., & Kluger, A. N. (2000). *Positive (negative) feedback:Encouragement or discouragement?* Last visit on March 29, 2006 from http://www/huji.ac.il/unew/main.html

Vandrick, S. (2000). *Language, culture, class, gender and class participation*. Paper presented at TESOL Annual International Convention, Vancouver.

Verschaffel, L., Greer, B., & De Corte, E. (2000). *Making sense of word problems*. Lisse, The Netherlands: Swets & Zeitlinger.

Wakabayashi, T. (2002). Bilingualism as a future investment: The case of Japanese high school students at an international school in Japan. *Bilingual Research Journal*, 26(3), pp.631–58.

Walkinshaw, I. and Duong, O. (2012). Native-and non-native speaking English teachers in Vietnam: Weighing the benefits. *TESL-EJ*, 16(3), pp.1-17

Wells, G. (1993). Reevaluating the IRF sequence: A proposal for the articulation of theories of activity and discourse for the analysis of teaching and learning in the classroom. *Linguistics and Education*, 5, pp.1–37.

Willis, J. (1996). A flexible framework for task-based learning. In J. Willis and D. Willis (Eds.), *Challenge and change in language teaching* (pp. 52-62).Oxford: Heinemann.

Wong Fillmore, L. (1991). When learning a second language means losing the first. *Early Childhood Research Quarterly*, 6, pp.323–46.

Wright, W.E. (2004). What English-only really means: A study of the implementation of California language policy with Cambodian-American students. *Bilingual Education and Bilingualism*, 7(1), pp.1–23.

Xanthou, M. (2011). The impact of CLIL on L2 vocabulary development and content knowledge. *English Teaching: Practice and Critique*, 10(4), pp.116–26.

Zehler, A. M., Hopstock, P. J., Fleischman, H. L., & Greniuk, C. (1994). *An examination of assessment of limited English proficient students.* Arlington, VA: Development Associates, Special Issues Analysis Center.

Ziv, A. (1988). Teaching and learning with humor: Experiment and replication. *Journal of Experimental Education, 6*(1), 37-44.

Appendices

三年　班　座號　姓名

一、注音

1.（　）「翅」膀。
（　）體重變「輕」了。
2.（　）我想去「動」物園。
3.（　）「忍」耐。
4.（　）「黃」色的花朵。
5.（　）生「命」真可貴。
6.（　）「採」「摘」蔬果。
7.（　）（　）爸爸「刻」了一個「印」章給我。
8.（　）

二、改錯字

1.（　）小華好勇趕，他可以一個人待在家裡。
2.（　）我升三年及了，所以我換了新教室。
3.（　）秋天真是個涼爽的李節。
4.（　）門外傳來奇怪的腳布聲。
5.（　）我變瘦了，所以這件衣服變松了。
6.（　）老師說看抱紙可以得到許多知識。
7.（　）公園裡的蝴蝶最愛吃花密。
8.（　）下星其就要考試了。
9.（　）大家都不知道他遲到的冗因。
10.（　）最近氣後一直不穩定。

三、選出正確的答案

1.（　）「頭髮都掉光了」的「光」與下列哪一個選項的「光」意思相同？①閃閃發「光」②為國爭「光」③把菜吃「光」了④發出亮「光」。
2.（　）「財物暫時用他人的，或將自己的財物暫時給他人使用」是①拿②借③請
3.（　）下面哪一組「　」中的字，注音相同？①「進」步／安「靜」②「垃」圾／快「樂」③「突」然／「呼」吸。
4.（　）下面哪一組字的部首相同？①頂／順②書／畫③或／找。
5.（　）吃力：①節省力氣②省力③費力。
6.（　）「剛」下過雨的「剛」是指：①時間過去很久②時間過去不久③還沒發生的。
7.（　）「事情還沒有做完就停止了」是指①半斤八兩②半工半讀③半途而廢。
8.（　）下面哪一組詞語是相反詞？①沿著／順著②斜斜的／直直的③山頂／山頭。
9.（　）究竟：①所以②本來③到底。
10.（　）下面哪一個詞語沒有包含「動作」？①黑色的頭髮②到處都是玩具③拿著風車。
11.（　）漂亮「極」了：①最初②地點③很、非常④最終。
12.（　）不聲不響：①說不出話來②不發出任何聲音③聽不見聲音④聲音響亮。

四、根據短文內容選出正確的答案

為什麼「福」或「春」字要倒著貼？

每逢農曆春節期間，家家戶戶都會在門上、牆上、窗戶上貼上大大小小的「福」字或「春」字。「福」代表「福氣」或「福運」的意思；「春」則代表「四季之首」或「生機」的意思。因此，我們可以看到有些人會將「福」字或「春」字倒過來貼，因為「倒」諧音「到」，表示「福已到」、「春已到」。這就是人們為什麼將「福」、「春」字倒著貼的用意。

1.（　）家家戶戶在什麼時候會貼上「春」字
①清明節②端午節③過年。
2.（　）春聯的「福」代表什麼？
①福運②生機③春天。
3.（　）春聯的「春」代表什麼？
①暖和②福運③生機。
4.（　）把「福」倒過來貼，代表什麼？
①福已到②把福氣送走③歡迎客人

發現萬有引力——牛頓

牛頓是英國著名的科學家，傳說有一次牛頓坐在蘋果樹下，被一顆掉下來的蘋果打到，他思考蘋果為什麼會向下掉，才發現了萬有引力，也因此被尊稱為「現代科學之父」。

牛頓從小由外婆撫養長大，個性內向、孤僻，但是對不明白的事物很有興趣，喜歡自己實驗。他中學時功課很差，有一次同學嘲笑他，他才發憤努力，考取劍橋大學，畢業後成為劍橋大學教授。他做實驗時十分專心，有一次他沉迷於做實驗，卻忘了吃飯，肚子餓時，就煮了一鍋水，把雞蛋丟下去煮，等到他的實驗告一段落，掀開鍋蓋要拿雞蛋時，卻發現鍋子裡根本沒有雞蛋，只有他的金錶！原來他太專心，把金錶當成雞蛋，丟進鍋子了。

1.（　）牛頓是哪一個國家的人？
①英國②美國③日本。
2.（　）牛頓因為被什麼打到，才因此發現萬有引力？①蘋果②梨子③柳丁。
3.（　）牛頓小時候的個性怎樣？①樂觀開朗②不喜歡交朋友③調皮搗蛋。
4.（　）牛頓為什麼會把金錶丟進鍋子裡煮？
①想要用金錶來做實驗
②太過專心，才會不小心丟進去
③雞蛋用完了，只好煮金錶。

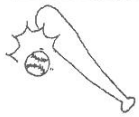
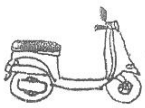
Grade III Class_____ No. _____ Chinese Name _____

I. Vocabulary Test (choose the correct words to match the pictures)

a. dentist	b. taxi	c. baseball	d. scooter	e. nurse
f. train	g. bicycle	h. airplane	i. soccer	j. piano

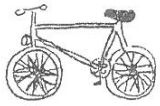
1. _____ 2. _____ 3. _____ 4. _____



5._____ 6._____ 7. _____ 8._____






Vocabulary Test (choose the correct place)

a. a playground	b. a supermarket	c. my school	d. a beauty shop
e. a housekeeper	f. a hospital	g. a swimming pool	h. a restaurant

9. I am hungry. I go to _____ .

10. I keep the house clean. I am _____ .

11. I am sick. I go to _____

12. I need a haircut. I go to _____ .

13. I am a student. I go to _____ .

14. I want to play. I go to _____ .

15. I need to buy some food. I go to _____ .

16. I usually swim in _____.

II. Grammar test

_____17. Where do ___ work? (1) you (2) she (3) John

_____18. I usually go ___on Sundays. (1) fishing (2) fish (3)fishing

_____19. Mark was ____ the best student of the year. (1) become (2) awarded (3) told

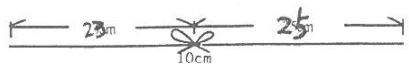
_____20. My mom made this cake ____. (1) do (2) by her (3) herself.

_____21. I go to school ____bus. (1) by (2) take (3) taking

_____22. Are _____ Helen's shoes ? (1) the (2) these (3) it

三年_____班　座號_____　姓名 _____

1. 四十一加上三十八，再加上二十四。答案是_____

2. 

打結的地方為10公分，繩子的共有多長？(cm：公分)
答案是_____

3. 今年爸爸的年齡是叔叔的2倍，10年後爸爸的年齡是叔叔的幾倍？ ①10倍 ② 2倍 ③小於2倍 ④5倍 。答案是_____

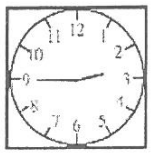
4. 請由大至小排列下列數字：①172 ②109 ③96 ④30 答案是_____

5. 桌上有8條紙片，每條紙片長4公分。若將這8條紙片排成一條直線，請問共有多長?答案是_____

6. 九乘七為多少？答案是_____

7. 2月1日的前一天是幾月幾日？答案是_____

8. 同樣長20公分的繩子分成①$\frac{1}{2}$ ②$\frac{1}{4}$ ③$\frac{1}{5}$ ④$\frac{1}{10}$ 那一小段會是最長？答案是_____

9. 
請問這是幾點? 答案是_____

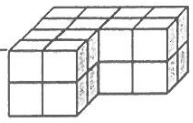
10. ① ■ ②▲ ③ ▬ ④◆ 那一個的圖形是最大？ 答案是_____

11. ①  ②  ③  ④  那個裝水最多？答案是_____

12. 
請問這個圖形共有幾個邊? 答案是_____

13. 
左圖是？①圓形 ②長方體 ③圓柱體 ④正方體 。答案是_____

14. 22＋9_____ 34. 請填入 “＜”，“＞” 或 “＝” 答案是_____

15. 右圖中共用了幾塊積木？答案是_____ 

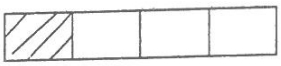
16. ①● ②▲ ③◥ ④★ 左圖中那個是有垂直的現象? 答案是_____

17. 8月的第一天是星期日，請問7月的30日是星期幾？答案是_____

18. 有33人排隊買火車票，大明排在第9個，他的後面還有幾個人？答案是_____

19. 小華用30公分的尺量書桌，尺不夠長，量了一次後，再量一次是12公分，請問桌子有多長？答案是_____

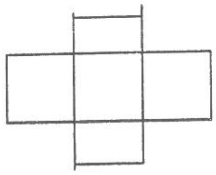
20. 用 5、7、3、1、9 排出一個最小的三位數。答案是_____

21.  斜線面積佔全部面積的幾分之幾？答案是_____

22. 有一個正方型，其中一邊為6公分。請問這個正方型面積為？答案是_____

23. ①銅板 ②汽球 ③黑板 ④漢堡，哪一項有平行的現象？答案是_____

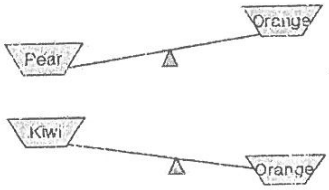
24. 請用1、2、3、4、5、填入下面圖中，橫和直三個數相加的答案一樣？



26. 6月1日是星期五，請問6月其他的星期五是幾日？答案是_____

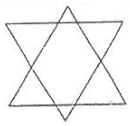
27. 一個五歲小孩需要7分鐘吃完一顆蘋果，若3位小孩一起開始各自吃一顆蘋果，請問需要多少時間會吃完？答案是_____

28. 下圖表示三種水果的重量，請問哪一種水果最重？答案是_____



註: pear:梨子 orange:柳丁 kiwi:奇異果

29. 下圖共有多少個三角型？答案是_____

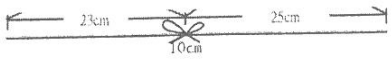


30. 小明、大華、可雲上不同的三所學校A、B、C。小明並不是上學校A或學校B。大華不是學校B的學生。請問可雲上哪一所學校？答案是_____

Grade III Class_____No. _____ Chinese Name: _____

1. 41 + 38 + 24= ?

Answer _____

2. 

If the length of the knot is 10 cm, how long is the rope?

Answer _____

3. 65 – 58 – 11= ?

Answer _____

4. Rank the following four groups of numbers from the highest to the lowest:

①172 ②109 ③96 ④30

Answer _____

5. There are eight pieces of paper. Each paper is 4 cm long. If all eight pieces of paper are put in one line, how long would they be?

Answer _____

6. What is 9 times 7?

Answer _____

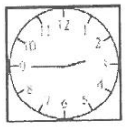
7. What is the day before February 1st ?

Answer _____

8. A piece of rope is 20cm long. If the rope is cut into pieces of ①$\frac{1}{2}$②$\frac{1}{4}$③$\frac{1}{5}$④$\frac{1}{10}$, which piece would be the shortest?

Answer____

9.



What time is it?

Answer _____

10.① ②▲ ③ ④◆ Which shape is the biggest?

Answer _____

11. ① ② ③ ④ Which glass can hold more water?

Answer ____

12.  How many sides are there?

Answer _____

13.  What is this shape? ①circle②cylinder③square④cube

Answer _____

六年　班　座號　姓名

一、注音

1（　）我喜歡呼吸著「沁」涼的空氣。
2（　）101「摩」天大廈是臺北的地標。
3（　）這塊招牌搖搖欲「墜」，看起來好可怕！
4（　）「鏗」鏘玫瑰是林憶蓮的成名曲之一。
5（　）若沒通過安全檢查，會被「勒」令歇業。
6（　）花海令人目不暇「給」。
7（　）層層的白雲繞著玉山的山「顛」。
8（　）白天和夜晚的景色真是「迥」然不同。
9（　）我們不能將朋友的秘密「洩」露出去。
10（　）「臘」月過完就是農曆新年了。

二、改錯字

1（　）天氣變冷了，媽媽叮矚我要多加件外套。
2（　）寄信前，記得在信封上填入郵褫區號。
3（　）你這種行為，根本就是診火打劫嘛！
4（　）小布很有禮貌，見到長輩一定掬躬問好。
5（　）能言善道的他說起話來口若縣河。
6（　）既然他誠懇的道歉了，你就原亮他吧！
7（　）農夫辛勤灌概，仔細照顧農作物。
8（　）弟弟因為吃了過期食物才會引發腹瀉。
9（　）弟弟想盡方法，企圖脫延上床睡覺的時間。
10（　）這場球賽失敗的原因，是因為我們太嬌傲輕敵。

三、選擇題

1（　）下列「　」中的成語，哪一個用法不適當？ ①在路人「見義勇為」的協助下，歹徒終於被警察制服②連年天災，不法商人「趁火打劫」，提高貨品的價錢③王教授「博學多聞」，很多學校都邀請他來演講④看姐姐一副「胸有成竹」的樣子，就知道她一定還沒準備好。

2（　）「禮貌的言語就像冬天的陽光，可以溫暖每一顆心。」運用了哪一種修辭法？
①譬喻②頂真③視覺摹寫④類疊

3（　）「早上，因為妳正趕著要去上課，我不好多說；晚上，因為是吃飯前，怕影響妳的情緒，我也沒講話。」運用了哪一種修辭法？ ①對偶②譬喻③映襯④類疊。

4（　）「花樹花，花樹底結南瓜。」運用了哪一種修辭法？①擬人②頂真③譬喻④誇飾。

5（　）下列「　」中的成語，哪一個用法不適當？ ①在路人「見義勇為」的協助下，歹徒終於被警察制服②連年天災，不法商人「趁火打劫」，提高貨品的價錢③王教授「博學多聞」，很多學校都邀請他來演講④看姐姐一副「胸有成竹」的樣子，就知道她一定還沒準備好。

6（　）選出錯誤的敘述： ①「傑作」是指優秀而特出的作品②「醬」的部首是「酉」部③「郁」的注音是「有」④「滑滑嫩嫩」是形容詞。

7（　）「因為他的□□，造成嚴重的結果。」□裡不適合填入哪一個詞語？ ①失誤②疏失③特殊④疏忽。

8（　）「擅長」： ①專精於某種技藝或學術②時間過了很久③私自延長時間④依自己的意見做決定，不理會他人的想法。

9（　）「低垂的夜幕中，萬物無聲一片寧靜，只聽到我手中的書本翻頁時沙沙的聲響，和自己規律的

Grade VI Class_____ No. _____中文姓名_____

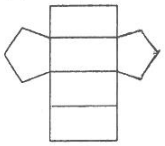
1. Look!A rock is rolling down.
   (A) giant (B) slow (C) useful (D) quick
2. Victor joined the ____singing contest and won first place. He sang the best in Taiwan.
   (A) world (B) school (C) world (D) medium
3. Emma: Mom, I don't like to study at home by myself.
   Mom: Why don't you join a study___?
   (A) group (B) exercise (C) reporter (D) surf
4. John can't use chopsticks well, so he eats with a___.
   (A) spoon (B) scissors (C) cup (D) bowl.
5. Woody: What's the ____ of your science report?
   Sam: Dinosaurs.
   (A) title (B) meaning (C) score (D) point
6. On Chinese New Year's Eve, families___for a big dinner.
   (A) watch the full moon (B) eat moon cakes (C) get together (D) take a walk
7. In a city, taking the MRT is more____than driving a car.
   (A) careful (B) famous (C) convenient (D) excited
8. The old lady has a kind heart. She is not rich and she often _____ money to help the poor.
   (A) give up (B) donates (C) take away (D) throw

II. Grammar Test

9. Mary: What are you doing, John?
   John: _____
   (A)I watch TV. (B) I watched TV. (C) I am watch TV. (D) I am watching TV.

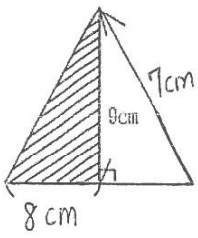
10. Mary: What did you do the day before yesterday?
    John: _____
    (A) I red a new storybook. (B) I read a new storybook. (C) I was red a new storybook. (D) I was reading a new storybook.
11. I have not heard from him for several days, but no news ___ good news.
    (A)is (B) am (B) were (D) are
12. I am as _____ as a bee.
    (A) busiest (B) busier (C) the most busy (D) busy
13. Don't worry. Everything will ___ fine.
    (A) be (B) is (C) are (D) being
14. Taipei 101 is one of _____ building in Taiwan.
    (A) the most famous (B) famousest (C) the famousest (D) the more famous
15. Please stop _____. I need to sleep.
    (A) making such a loud noise. (B) to make a such loud noise. (C) making a noise such loud. (D)

六年 _____班　座號: _____ 姓名: _____

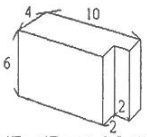
1. 270 至少要減去多少才是 13 的倍數? 答:_____
2. 有一顆西瓜重 5 公斤，曉明吃了 1 公斤 20 公克，請問還剩多少? 答:_____
3. 14 與 18 的最大公因數為? 答:_____
4. 林媽媽在市場想買果汁，果汁有大瓶(1800cc)、中瓶(1000cc)、小瓶(600cc)。現在她有三種選擇：①買一罐大瓶 240 元、或②買兩罐中瓶特價為 280 元，或③買一罐小瓶價格為 90 元。請問哪一種選擇可以買到最便宜的果汁? 答:_____
5. 美美從今早 11 點 15 看電視看到下午 3 點 08 分。請問她總共看了多久的電視? 答:_____
6. 在 1 千公尺的跑步競賽中，國華用了 1 分 9 秒，小明用了 71 秒，家元用了半分鐘完成競賽。請問誰跑得最快? 答:_____
7. 

這是以下哪一種的展開圖？①五角柱體②六角柱體③五角錐④六角錐 答:_____

8. 左圖斜線部分的面積？(cm:公分) 答:_____



9. 一個面積為 $24m^2$ 的長方形，和一個底是 8m 的三角形面積相等，請問三角形的高是多少？答:_____
10. 水果店進貨 20 箱櫻桃，每箱重 6 公斤，昨日售出 $4\frac{2}{3}$ 箱，今天賣掉了 43,810 公克，還剩下多少公斤及多少公克？ 答:_____
11. 等腰三角形甲角為 70 度，乙丙角各是? 答:_____
12. 五角柱有幾個頂點？答:_____
13. 甲彩帶長 0.15 公尺，乙彩帶是甲彩帶的 9 倍長，乙彩帶長多少公尺?答:_____
14. 週六動物園入園人數是 5687 人，大人和小孩的人數比是 4：7，請問入園的大人有幾人？ 答:_____
15. 下圖體積是多少？(單位:公尺) 答:_____

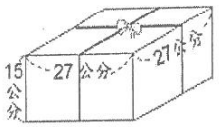


16. 一億零四仟零七寫為阿拉伯數字為？ 答:_____

17. $41-7 \times 4 = ?$　　答：_____

18. $39 + (11-2) \square 43$.　請在□填入＝或 ＞ 或 ＜　　答：_____

19. 用繩子捆綁 1 盒月餅，如下圖所示。打結的地方用了 10 公分，算算看，共用了多少公分的繩子？　答：_____



20. 三年 1 班全班 18 人的體重共重 776 公斤；三年 2 班全班 19 人的體重共重 807.5 公斤，請問哪一班的平均體重比較重？ 答：_____

21. 在國家超市，6 公斤的壽司米賣 366 元。在幸福雜貨店，重 4 公斤的壽司米售價為 408 元。請問哪家的米賣得較便宜？ 答：_____

22. 一個籃子裡有 14 顆蘋果、8 顆柳丁與 26 個桃子混在一起。若你閉上眼睛並從籃子裡取出一顆，你拿到柳丁的機率是多少？ 答：_____

23. 小明參加五次數學考試。他前三次的考試平均成績為 95 分，最後兩次的平均成績為 90 分。請問小明五次的平均成績為幾分？ 答:_____

24. 觀察下列各組的關聯性，並填入數字：

(1 ,4, 8), (2, 8, 16), (3, 12, 24), (4, 16, 32), (_____, _____, _____)

25. 請在下列圖型中畫一條線，使這個圖呈現對稱。若此圖無法呈現對稱特性，請打「X」。

26. 請在下列圖型中畫一條線，使這個圖呈現對稱。若此圖無法呈現對稱特性，請打「X」。

27. 9,999,999 再加上 10 個 1 仟的數是？ 答:_____

28. 小慧與他的家人去海邊玩。他們先游泳戲水一小時，然後又花了一個半小時在海邊堆沙與蓋城堡，接著又打排球 40 分鐘。若他們結束打排球的時間是下午五點鐘，請問他們是幾點到達海邊的？答:_____

29. 大華騎腳踏車出門。他往南騎了五條街後又向東騎了兩條街，接著又向北騎了六條街，又向西騎了兩條街。請問現在大華要騎往哪個方向才能回到家？答: _____

30. 轎車不比小巴士貴，機車不比轎車貴，腳踏車比機車便宜。請問哪一種車最貴？答: _____

Grade VI Class_____ No. _____ Chinese Name: _____

1 . How much needs to be subtracted from 270, before it can be a multiple of 13 ?

Answer _____

2. A watermelon weighs 5 kilograms. Vicky ate 1 kilogram and 20 grams. How many kilograms and how many grams are left?

Answer _____

3. What is the greatest common factor of 14 and 18?

Answer _____

4. John wants to buy juice. He has three options:

① One large bottle (1800cc) of juice costs NTD240;

② One pack of two medium bottles (1000cc each) of juice costs NTD280;

③ One small bottle (600cc) costs NTD70. Which option is cheaper?

Answer _____

5. Mary watched TV from 11:15 in the morning to 03: 08 in the afternoon. How much time did she spend in watching TV?

Answer _____

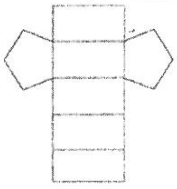
6. During a race of 1000 meters, Bill used one minute and 9 seconds, Kate used 71 seconds, and Kate Paul used half a minute to finish the race respectively. Who ran the fastest?

Answer _____

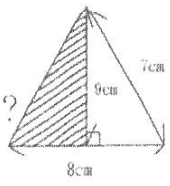
7. What is the following? (1) pentagon pillar (2) hexagon pillar

(3) Pentagonal Pyramid (4) Hexagonal Pyramid

Answer _____



8. What is the area of part coloured in ?



Answer _____