

# A COMPARISON OF HONG KONG PRIMARY FOUR STUDENTS' CHINESE AND ENGLISH READING ATTAINMENT IN 2016

SHEK KAM TSE\*, LIN LIN\*\* & HUNG WAI NG\*

*\*Division of Chinese Language and Literature, Faculty of Education, The University of Hong Kong, Pokfulam, Hong Kong \*\*International Culture Exchange School, Shanghai University of Finance and Economics, Shanghai, P. R. China*

## Abstract

This study examines Hong Kong primary four (P4) students' Chinese and English reading test performance in a bilingual reading proficiency study (BR) conducted in 2016, the fifth round in a series of studies monitoring the bilingual reading competence of primary school students in Hong Kong since 2004. It also compares students' bilingual reading performance in 2016 with that in the 2013 round of testing. A total of 3,592 P4 students from 38 schools in Hong Kong participated in the study. Significant improvements were found both in the students' Chinese and English reading test performance, with marked increases in the overall English reading test scores and in performance on literary and informational texts. Such improvements may be due to the implementation of the English Language Curriculum, support from the Hong Kong Language Committee and new medium of instruction (MOI) arrangements in Hong Kong primary schools. The students' performance was significantly worse on Chinese literary texts overall and on the first three levels of reading comprehension processes in BR 2016. This may be a consequence of the increasing use of digital devices among young students and of low achievers' poor test performance. Future studies need to examine whether there are causal relationships between the variables mentioned above and the bilingual reading test performance of P4 students in Hong Kong.

Keywords: P4 students, bilingual reading test performance, literary and informational texts, levels of comprehension processes, developmental comparison

## 1. INTRODUCTION

Chinese and English have long been regarded as majority languages used in Hong Kong due to its political history, economic status and social and cultural development since its colonial days. Especially after the transfer of sovereignty in 1997, local government has adopted a “biliterate and trilingual” policy, in which Hong Kong residents need to be proficient in written Modern Standard Chinese and English, and able to speak competently in Cantonese, Putonghua and English (Tung, 1997). Under this policy, the Education Department (ED) requires most local public secondary schools to adopt Chinese (i.e. Cantonese), the mother tongue of around 90% of Hong Kong residents, as the basic medium of instruction (MOI), the language used to teach non-language content subjects, except in schools that can provide evidence to the authorities that their teachers and students are competent in teaching or learning in English (Tse, Shum, Ki, & Wong, 2001). The implementation of such a MOI policy has triggered a heated debate among the public. To alleviate the controversy, the ED (2009) decided to “fine-tune” the policy by allowing individual schools to adopt a MOI themselves based on the needs and language ability of their students and teachers.

Although Chinese is used as the MOI in most primary schools, the implementation of MOI practices in some primary schools may be influenced by the language policy in the secondary schools as students prepare for their coming secondary education (Wang & Kirkpatrick, 2015). Hong Kong primary school students have performed outstandingly well in the Progress in International Reading Literacy Study (PIRLS) in recent years, a large-scale comparative project that examines the reading attainment of Primary Four (P4) students across countries and regions at 5-year intervals, in which Hong Kong students’ average Chinese reading scores achieved the second place in 2006 and the first place in 2011 (Mullis, Martin, Foy, & Drucker, 2012; Mullis, Martin, Kennedy, & Foy, 2007). This has greatly attracted the attention of the general public. The local government usually use the results of this assessment information to evaluate the quality of education systems and to identify factors influencing Chinese literacy development (Tse, Zhu, Hui, & Ng, 2017).

The Government and the public are especially interested in primary school students’ reading proficiency in English, another official language in Hong Kong, due to its traditional importance in the employment market and higher education in Hong Kong. However, there has been increasing concern in recent years about declining English standards since the implementation of the compulsory Chinese MOI policy (Evans & Green, 2003; Poon & Lau, 2016). In fact, P4 is increasingly being identified as a critical period following which students make the transition from learning to read to reading to learn. Previous research indicates that P3 and P4 students who fail to acquire the basic skills needed to comprehend classroom texts may face life-long learning difficulties (Araújo, Morais, & Costa, 2013). Bearing on public concerns, a series of the bilingual reading proficiency studies (BR) have been conducted to examine P4 students’ Chinese and English reading competence in Hong Kong. The first

cycle of the study took place in 2004, and subsequent studies have been conducted at a 3-year interval, in 2007, 2010, 2013 and 2016 respectively. The present paper investigates P4 students' bilingual reading proficiency in Hong Kong in the BR 2016 study, and compares students' bilingual reading performance between BR 2013 and BR 2016, tracking the development of students' reading proficiency across cycles.

### *Bilingual reading literacy in Hong Kong*

Reading literacy is “the ability to understand and use those written language forms required by society and/or valued by the individual” (Mullis & Martin, 2015, p.11). Reading literacy in both Chinese and English is important in Hong Kong as Hong Kong is an international centre of commerce and finance as well as a special administrative region of China. After the handover of sovereignty in 1997, a biliterate and trilingual policy was announced as the overall language policy in Hong Kong. Under this policy, both Chinese and English were recognized as the official written languages. Cantonese, Putonghua and English share equal status as spoken languages. A general objective of the language policy was to assist school leavers in Hong Kong to communicate with the Mainland and the outside world smoothly and confidently, especially in commerce and industries (Zhang & Yang, 2004).

To promote this language policy, the ED started to implement the Chinese-medium instruction (CMI) policy, also known as the “mother tongue” policy, at junior secondary level (Years 7-9) in September 1998. As mentioned earlier, about two-thirds of secondary schools were compelled to adopt CMI. Only 114 of Hong Kong schools were allowed to use English as the medium of instruction (EMI). The implementation of this policy led to some criticism as many parents and students complained about “the creation of an ‘elite’ English-medium stream and an apparently ‘inferior’ Chinese-medium stream. This was widely regarded as high-handed, discriminatory, and socially divisive” (Evans, 2002, p.98), along with the decrease of English standards and a loss of students' motivation to learn English (Poon, Lau, & Chu, 2013). As English is the MOI at tertiary level and superimposed on some professional careers, such as the judiciary and the government administration, students in EMI schools were perceived as having an advantage of gaining access to valuable linguistic capital over their CMI counterparts. This increased their possibilities of educational and professional upgrading (Evans, 2011). Recent research has supported parents' fears that EMI-school students enjoy a distinct advantage over their CMI peers in gaining admission to university (Evan, 2011) and are better able to meet the demands of tertiary education (Evans & Morrison, 2017).

In 2009, considering CMI-school students' life-chances, the Government decided to “fine-tune” the policy by permitting schools to adopt EMI classes, partial EMI classes and/or CMI classes, according to their students' and teachers' language proficiency and school support (Chan, 2014). The Government did not implement any clear MOI policy in primary schools and the majority of primary schools adopted CMI in most subjects except for English and Putonghua subjects (Kan, Lai, Kirkpatrick, &

Law, 2011; Pan, 2000). However, the language policy in secondary schools may have had a washback effect on the students' bilingual reading development in primary schools as primary school teachers see themselves as having to prepare students for secondary education (Wang & Kirkpatrick, 2015). Tsui (1992) argued that many students who entered EMI education at secondary level were incompetent in coping with an all-English curriculum, since they had only learned English as a tool for communication in primary school, which is insufficient for studying content subjects in English. Without support from the Government and primary schools to bridge the English proficiency gap, it is highly likely that students might fail to achieve biliteracy at secondary or higher education (Cummins, 2000).

Many parents in Hong Kong were delighted that their children were learning English at an early age and they were willing to help their children in this regard as they realized the importance of English in their children's future life (Lao, 2004). However, many parents themselves lacked competence in English and they felt unable to support their children in the task of learning English. At the same time, there was a lack of clear guidelines about how schools might effectively implement effective bilingual education in primary schools (Wang & Kirkpatrick, 2015). Therefore, there is a need to conduct a long-term large-scale study to monitor primary students' biliteracy development and to provide the Government and the public with a valid oversight of the current situation. Nor were there suggestions about how Chinese and English education might be implemented alongside one another in the language policies adopted by the wide range of primary schools in Hong Kong.

#### *The assessment of Chinese and English reading literacy in Hong Kong*

PIRLS, conducted by the International Association for the Evaluation of Educational Achievement (IEA), is an international project that examines the reading attainment of P4 students through their mother tongue across countries and regions worldwide and tracks trends in their reading achievement and reading experiences at home and in school every five years (Mullis, Martin, Ruddock, O'Sullivan, & Preuschoff, 2009). The PIRLS written assessments evaluate P4 students' reading ability for two reading purposes: for literacy experience and for information in expository texts, both of which are important at the age groups. It also examines students' reading performance on four specific levels of comprehension processing: (1) focusing on and retrieving explicitly stated information; (2) making straightforward inferences; (3) interpreting and integrating ideas and information; (4) evaluating and criticizing content and textual elements (Mullis et al., 2012). These tasks were developed with reference to established theories of reading comprehension (Kintsch & Kintsch, 2005; Perfetti, Landi, & Oakhill, 2005; vanDijk & Kintsch, 1983). The results of the assessments provide valuable information for different concerned parties and stakeholders to examine the implementation of curricula and instructional practices and the development of school environments and learning resources (Mullis et al., 2009).

P4 students in Hong Kong first participated in the Reading Literacy Study in 1991. The study results indicated that Hong Kong students performed at an average level on the reading proficiency test with reference to the international standards (Elly, 1993; Johnson & Cheung, 1995). Ten years later, Hong Kong P4 students took part in the first PIRLS assessment, in which their reading performance was still around the “average” level. According to the PIRLS 2001 report, P4 students in Hong Kong were competent at processing documentary texts but poor on understanding literary texts (Mullis, Martin, Gonzalez, & Kennedy, 2003).

Due to Hong Kong P4 students’ mediocre performance in PIRLS 2001, alongside the issue of the MOI issue and its implementation via a controversial language policy after the 1997 handover, the first cycle of the bilingual study (BR 2004) was conducted to monitor primary school students’ Chinese and English reading literacy in Hong Kong in 2004 as follow-up research to PIRLS 2001. To follow the trends over time in international reading achievements and align these with the published international standards, the study adopted a conceptual framework and the assessment instrument of PIRLS 2001 to examine and compare the Chinese and English reading achievements of P4 students in Hong Kong. It found that P4 students’ Chinese reading attainment had increased after PIRLS 2001. However, the discrepancy between high and low achievers’ Chinese reading performance had widened. As for the comparison of students’ Chinese and English reading literacy, the result revealed that their English literacy was around 70% of the performance of their Chinese reading literacy.

In the second cycle of the bilingual study (BR 2007), the results indicated that about 24% of students’ both Chinese and English reading literacy was above the international mean score of 500 used in the PIRLS reports. Student participants’ bilingual reading literacy had increased significantly at all reading levels compared with their peers’ performance in BR 2004. Students’ English literacy average was 74% of that of their Chinese reading literacy. Moreover, students performed better on high-level Chinese reading comprehension tasks (Tse, Lam, Loh, Hui, & Ng, 2013).

The third cycle of the bilingual study (BR 2010) was conducted in 2010. Results from this study showed that students’ Chinese reading test performance had decreased a little compared with the performance in 2007, especially among high-ability participants. No significant difference was found on the students’ English reading test performance between the BR 2007 and BR 2010 studies (Tse et al., 2013).

In the fourth cycle of the bilingual study (BR 2013), students’ Chinese reading literacy was found to have decreased significantly, which might have attracted attention from the Government concerned with Chinese language education (Tse, Hui, Ng, & Lam, 2014). The gap between the students’ Chinese and English reading literacy remained stable between BR 2010 and BR 2013. In BR 2013, students’ English reading literacy was approximately equivalent to 75% of the Chinese reading literacy scale, and 12.8% of the students achieved both Chinese and English reading comprehension scores over 500 (Tse et al., 2014).

The present study continued the work of previous cycles to investigate the bilingual reading literacy of P4 students in Hong Kong in 2016, including their test performance on different text types and levels of comprehension, providing the Government and the public with the latest information about Chinese and English reading performance in primary schools. The study also compared students' reading test performance between BR 2013 and BR 2016 to examine the development of primary school students' bilingual reading literacy over time. Since BR 2013 and BR 2016 were the two cycles of studies after the implementation of the fine-tuning MOI policy, the comparison of students' bilingual reading performance between these two cycles yielded data reflecting the impact of the revised language policy, offering the Government useful information for future policy evaluation and curricula development in general. The study aimed at answering the following questions:

- 1) How do P4 students in Hong Kong perform in the Chinese and English reading tests in BR 2016?
- 2) Regarding the reading purposes and comprehension processes, how do P4 students in Hong Kong perform both in English and Chinese reading tests?
- 3) Compared with the previous bilingual reading test performance in BR 2013, how does the Chinese and English reading attainment in BR 2016 differ?

## 2. METHOD

### *Participants*

A total of 3,592 P4 students from 38 schools in Hong Kong participated in the present study by completing the bilingual reading attainment test. These participants were selected at two levels. First, 38 schools were chosen from those attending the previous four cycles of studies, with records of high, medium and low reading achievers. Then, two classes of P4 students from each school were randomly selected. Among these participants, 1,875 (52.2%) were male and 1,717(47.8%) were female. Their ages were between 9 and 10 years.

### *Instruments*

The Bilingual Reading Attainment Test was adapted from the reading assessment procedures used in PIRLS 2006 and 2011. PIRLS is an international comparative study that examines P4 students' reading achievement at five-year intervals. Its reading comprehension test was developed validly for measuring reading literacy in the first language suitable for each P4 student in the participating countries and regions, including Hong Kong, which had been used and revised in the past four cycles since 2001. A group of experts from countries participating in assessing selected texts and designed and reviewed the test items together with the scoring guides to ensure that the assessment was appropriate for the grade-level (Mullis et al, 2009).

Based on the PIRLS framework for assessing reading attainment, the reading attainment test in the present study evaluated students' Chinese and English reading performance, with two overarching purposes for reading: for literary experience and to acquire and use information in expository texts. In addition, four comprehension processes, developed with reference to Kintsch's (1998) theories of the processes underlying text comprehension that included textbase and situation models, were used as a foundation for developing the PIRLS comprehension questions. The four comprehension processes were: (1) to focus on and retrieve explicitly stated information; (2) to make straightforward inferences; (3) to interpret and integrate ideas and information; (4) to evaluate content and textual elements (Kintsch & Kintsch, 2005; Mullis et al., 2012; Perfetti et al., 2005; Pressley, 2002; vanDijk & Kintsch, 1983). Table 1 presents a breakdown of the reading attainment test for each reading purpose and comprehension process.

*Table 1. Percentages of the reading attainment test items for reading purposes and comprehension processes.*

Reading Attainment Test	
<i>Purposes for Reading</i>	
Literary Experience	50%
Acquire and Use Information	50%
<i>Processes of Comprehension</i>	
Focus on and Retrieve Explicitly Stated Information	20%
Make Straightforward Inferences	30%
Interpret and Integrate Ideas and Information	30%
Evaluate and Critique Content and Textual Elements	20%

The reading attainment test was designed in the form of booklet. In total, there were eight booklets. Each booklet included one Chinese text and one English text. All the Chinese texts, chosen from the original English texts used in PIRLS 2006 and 2011, were checked using forward and backward translations to ensure their quality and accuracy. Piloting of tests was performed to make sure that the difficulty levels of the two text versions were comparable. The Chinese texts were finalized after they had been verified for textual equivalence by IEA language experts.

Each booklet contained one text type for literary experience and one expository text for acquiring and using information. To attain authenticity in the assessment reading experience, the reading texts were those read by students in their daily life and reflected students' in and outside of school reading experiences (Mullis and Martin, 2015). The assessment texts in English generally averaged about 800 words, while the length of the Chinese version varied somewhat due to the translation factor. Rotation of text type and the text language was adopted to ensure that the participants were randomly selected to complete the booklets. There were equal numbers of students assigned to each booklet. Table 2 presents the matrix-sampling blocks of the 2016 reading attainment test, and explains how the text types and the text languages were rotated to form the booklets. Multiple choice and construct-

response questions were used to assess students' reading ability in understanding literary and informational texts. On average, the questions for each text were made up of approximately seven multiple-choice items, two or three short-answer items, and one extended-response item.

*Table 2. Matrix-sampling blocks of the 2016 reading attainment test.*

Booklet No.	Text Language	
	Chinese	English
1	L1	I1
2	I2	L1
3	L2	I1
4	L1	I2
5	I2	L2
6	I1	L1
7	L2	I2
8	I1	L2

*Note.* L=Literary text; I = Informational text.

#### *Data collection, preparation, and analyses*

*Data collection.* The participants were required to complete the questions for the first text in the bilingual reading attainment test within 40 minutes. Then they took a 10-minute break and were asked to finish the second text within another 40 minutes. The overall testing time was 90 minutes.

*Data preparation.* The study used dichotomous scoring for multiple-choice questions in the reading attainment test, with 0 points for wrong items and 1 point for correct answers. Answers to construct-response questions were evaluated by the accompanying scoring guide, in which a full score was awarded for a complete response, a partial score for an incomplete answer and a zero score for an incorrect response. Construct-response items were worth one or two points for the short-answer items and three points for extended-response questions. Two experienced language teachers and six student-teachers were employed to mark the construct-response items. Each item was rated by two raters. The inter-rater reliability reached 0.83. The scoring of every test answer was double-checked to ensure correctness (Mullis & Prendergast, 2017). Performance of the bilingual reading attainment tests was reported in line with the PIRLS score scale procedure. The test score ranged from 0 to 1000, in which most of the student participants' test performance were between 300 and 700 marks. According to the previous rounds of PIRLS study, the centre point of the scale is 500, which was used as a point of reference for comparing reading attainments between the two languages (Mullis et al., 2012). All the reading test data were manually input into an SPSS 22 (IBM computer, 2013).

*Data analyses.* Descriptive statistics, including mean (*M*), standard deviation (*SD*), minimum and maximum, of the Chinese and English reading attainment tests

and their respective subtext types were calculated. The percentages of the participants' correct responses for the four levels of comprehension questions were computed for both Chinese and English tests and independent sample *t*-tests were performed to investigate whether the differences in the percentages of the correctness were significant for the two language tests. Independent sample *t*-tests were also conducted to examine whether there were significant differences between the mean scores of the 2013 and 2016 bilingual reading attainment tests, subtext types and the four reading comprehension levels.

### 3. RESULTS

#### *Overall reading test performance in Chinese and English in BR 2016*

The Hong Kong P4 students' average Chinese reading attainment was 558.89 ( $SD = 52.35$ ) in 2016 study, which exceeded the international mean score of 500 in the PIRLS study. This indicated that the Hong Kong P4 students' first language reading literacy outperformed that of many countries participated in the PIRLS study. The students' average English reading test performance was 445.54 ( $SD = 75.73$ ). Table 3 presents the details of the descriptive statistics for the Chinese and English reading attainment tests. Among the participants, 23.22% achieved the international mean score, which implied that these students' reading literacy was as good as that of participants from English-speaking countries.

*Table 3. Descriptive statistics for Chinese and English reading test performance in BR 2016*

	<i>N</i>	Min	Max	<i>M</i>	<i>SD</i>
Chinese reading score	3592	349	685	558.89	52.35
English reading score	3592	335	676	445.54	75.73

Further comparisons between P4 students' Chinese and English reading test performance in Hong Kong showed that the students' average English reading test score was equivalent to 79.22% of the average Chinese reading attainment score. 22.48% of the students had both Chinese and English reading test scores above 500, the international mean. 8.10% of the participants' Chinese and English reading test performance both achieved 558.89, the mean score for Chinese reading attainment, which suggested that the students' reading literacy in the two languages is roughly equivalent.

*Reading test performance in Chinese and English in BR 2016: Reading purposes and processes of reading comprehension*

In terms of students' Chinese reading test performance on the two reading purposes and at the four levels of reading comprehension processing, it was found that students obtained an average of 79.45% of correct answers on literary texts, and achieved 80.86% of correct responses on the informational texts for the questions designed for focusing on and retrieving explicitly-stated information (Level 1). A similar result was found between the two text types for the questions assessing students' ability to make straightforward inferences (Level 2), in which students obtained 71.12% of correctness on the literary texts and 70.28% on the informational texts. As for the questions that examined students' ability to interpret and integrate ideas and information (Level 3), students had an average of 59.28% of correctness on the literary texts and 53.65% on the informational texts. Students performed slightly better on questions examining and evaluating content language and textual elements in the literary texts (Level 4) with 58.49% of correct responses on understanding informational texts, with 50.46% of correctness. In summary, the students' Chinese test performance was similar on questions that assessed the first two levels of comprehension processes across the two text types. The students performed better on the literary tasks than they did on the informational tasks at the third and fourth levels.

Turning to students' English test performance on reading for different reading purposes and processes of reading comprehension, the percentages of correctness on the informational texts were higher at the first three levels of reading processes than those on the literary texts. Students obtained 47.15% of correctness on average for questions assessing their English reading ability in focusing on and retrieving explicitly-stated information (Level 1) on the informational texts, and 33.34% on the literary texts. The students also achieved 38.87% and 24.99% of correctness respectively on questions examining their ability to make straightforward inferences (Level 2) and interpret and integrate ideas and information (Level 3) on informational texts, while they obtained 33.04% and 19.58% of correctness on the literary texts. The students' performance was similar on questions of examining and evaluating content language and textual elements (Level 4), in which 24.16% of correctness was found on the informational texts and 24.24% on the literary texts.

Comparison of the students' reading test performance in the two languages showed that students obtained higher percentages of correct responses in Chinese on both text types and all levels of reading comprehension processes than they achieved on the English test. The discrepancies in percentages of correctness in Chinese and English reading tests ranged from 26.30% for Level 4 in the informational texts to 47.52% for Level 1 in the literary texts. The results of the independent *t*-tests indicate that these differences were all significant across the levels of comprehension in both literary and informational texts. Table 4 displays details of statistical

analyses that compared students' percentage of correctness in Chinese and English test performance on the text types, and in the levels of comprehension.

*Table 4. Comparison of students' Chinese and English reading test performance in terms of reading purposes and levels of reading comprehension processes.*

Percentage of Correct Answer		Language	Mean	SD	<i>t</i>	<i>p</i>
Reading Attainment on Literary Experience	Level 1	Chinese	79.45	28.95	40.71	<.001
		English	33.34	38.38		
	Level 2	Chinese	71.12	24.54	44.94	<.001
		English	33.04	26.39		
Reading Attainment on Acquiring and Use of Information	Level 3	Chinese	59.28	30.61	41.56	<.001
		English	19.58	26.48		
	Level 4	Chinese	58.49	32.54	32.26	<.001
		English	24.24	31.76		
Reading Attainment on Acquiring and Use of Information	Level 1	Chinese	80.86	25.64	34.02	<.001
		English	47.15	32.99		
	Level 2	Chinese	70.28	28.34	30.38	<.001
		English	38.87	33.06		
	Level 3	Chinese	53.65	27.06	30.34	<.001
		English	24.99	29.19		
	Level 4	Chinese	50.46	39.40	21.08	<.001
		English	24.16	35.23		

#### *Comparison between bilingual reading attainment in BR2013 and BR2016*

An independent *t*-test was adopted to examine whether mean differences existed across the Chinese and English reading test performance between BR2013 and BR2016, two cycles of bilingual reading studies. There was a significant difference in the overall Chinese reading test scores in BR 2013 ( $M = 549.1$ ,  $SD = 67.94$ ) and BR 2016 ( $M = 558.89$ ,  $SD = 52.35$ );  $t(3628) = 5.72$ ,  $p < .001$ . A significant difference was also found on the overall English reading test performance in BR 2013 ( $M = 412.49$ ,  $SD = 78.14$ ) and BR 2016 ( $M = 445.54$ ,  $SD = 75.73$ );  $t(5721) = 15.77$ ,  $p < .001$ . Regarding the students' Chinese reading test performance in the two text types, students performed better on literary texts in BR2013 ( $M = 558.26$ ,  $SD = 47.85$ ) than those in BR 2016 ( $M = 546.38$ ,  $SD = 59.73$ ),  $t(3419) = -6.79$ ,  $p < .001$ . No statistically significant difference was revealed between students' Chinese reading test scores in the informational texts in BR 2013 and those in BR 2016. The students obtained significantly higher English reading scores in the literary texts in BR 2016 ( $M = 424.89$ ,  $SD = 74.13$ ) than those in BR 2013 ( $M = 411.69$ ,  $SD = 77.89$ ),  $t(3868) = 5.43$ ,  $p < .001$ . A similar significant difference was found in the students' English reading test scores in the informational texts, in which the students in BR 2016 ( $M = 461.44$ ,  $SD = 77.27$ ) performed much better than those did in BR 2013 ( $M = 429.39$ ,  $SD = 68.79$ ),  $t(3629)$

= 13.61,  $p < .001$ . Table 5 shows the details of the comparison of Chinese and English reading test performance in two periods.

Table 5. Comparison of bilingual reading test performance by trial time.

Reading Scores	Year of Study	Mean	SD	<i>t</i>	<i>p</i>
Chinese Reading Score	BR2013	549.11	67.94	5.72	< .001
	BR2016	558.89	52.35		
English Reading Score	BR2013	412.49	78.14	15.77	< .001
	BR2016	445.54	75.73		
Chinese Literary Score	BR2013	558.26	47.85	-6.79	< .001
	BR2016	546.38	59.73		
Chinese Informational Score	BR2013	564.72	46.14	1.53	> .05
	BR2016	567.05	48.15		
English Literary Score	BR2013	411.69	77.89	5.43	< .001
	BR2016	424.89	74.13		
English Informational Score	BR2013	429.39	68.79	13.61	< .001
	BR2016	461.44	77.27		

In terms of students' Chinese test performance on four levels of reading comprehension processes across two cycles, it was found that students in BR 2013 obtained statistically significant higher percentages of correct responses on the first levels of comprehension processes ( $t(2556) = -8.33, p < .001$ ;  $t(2521) = -12.50, p < .001$ ;  $t(2402) = -7.71, p < .001$ , respectively) on the literary texts than those in BR 2016. No significant difference was revealed on the percentage of correctness between BR 2013 and BR 2016 for the fourth level of reading processes. There were significant differences between the percentages of correct answers for all four levels of reading comprehension processes in the Chinese informational texts. In the first two levels, students in BR 2016 performed significantly better than they did in BR 2013 ( $t(3464) = 26.44, p < .001$ ;  $t(2864) = 9.27, p < .001$ , respectively); in the latter two levels, students in BR 2013 obtained significantly higher percentages of correctness than their peers in BR 2016 ( $t(2858) = 6.77, p < .001$ ;  $t(1879) = 3.77, p < .001$ , respectively). Table 6 shows details of the comparison of students' Chinese test performance concerning the reading purposes and reading levels across two cycles.

Table 6. Comparison of students' percentages of correct answers in Chinese reading tests in terms of reading purposes and reading levels in BR 2013 and BR 2016.

Percentage of Correct Answer		Year of Study	Mean	SD	t	p
Chinese Reading Attainment on Literary Experience	Level 1	BR2013	87.83	24.07	-8.33	<.001
		BR2016	79.45	28.97		
	Level 2	BR2013	81.89	20.82	-12.50	<.001
		BR2016	71.12	24.53		
	Level 3	BR2013	67.86	27.61	-7.71	<.001
		BR2016	59.28	30.58		
	Level 4	BR2013	60.61	36.00	-1.57	>.05
		BR2016	58.49	32.36		
Chinese Reading Attainment on Acquiring and Use of Information	Level 1	BR2013	54.63	33.99	26.44	<.001
		BR2016	80.86	25.61		
	Level 2	BR2013	59.33	38.93	9.27	<.001
		BR2016	70.28	28.23		
	Level 3	BR2013	60.67	26.45	-6.77	<.001
		BR2016	53.65	27.00		
	Level 4	BR2013	57.03	47.82	-3.77	<.001
		BR2016	50.46	39.39		

Regarding the students' English reading test performance in two study periods, it was shown that the students in BR 2013 obtained significantly higher percentages of correct answers than their peers in BR 2016 for the first two levels of comprehension processes ( $t(2259) = -8.90, p < .001$ ;  $t(2159) = -5.46, p < .001$ , respectively) on the literary texts. No significant differences were found on the percentages of correctness for Level 3 and Level 4 questions between BR 2013 and BR 2016. As for the students' English test performance on the informational texts, statistically significant differences on the percentages of correct responses were identified for questions assessing all the 4 levels of comprehension processes. Specifically, students in BR 2016 obtained higher percentages of correctness for the first level ( $t(3365) = 12.07, p < 0.001$ ) than those in BR 2013 while they achieved lower percentages of correct answers for the second ( $t(2856) = -6.47, p < .001$ ), third ( $t(1964) = -6.92, p < .001$ ) and fourth levels ( $t(1642) = -3.22, p < .001$ ). Table 7 reports the results of independent  $t$ -tests for comparing students' percentages of correct responses in English reading tests in two study periods.

Table 7. Comparison of students' percentages of correct answers in English reading tests in terms of reading purposes and reading levels in BR 2013 and BR 2016.

Percentage of Correct Answer		Year of Study	Mean	SD	t	p
English Reading Attainment on Literary Experience	Level 1	BR2013	46.43	37.80	-8.90	<.001
		BR2016	33.34	38.38		
	Level 2	BR2013	38.75	27.54	-5.46	<.001
		BR2016	33.03	26.35		
Level 3	BR2013	18.31	25.37	1.24	>.05	
	BR2016	19.58	26.48			
Level 4	BR2013	26.13	31.99	-1.49	>.05	
	BR2016	24.24	31.97			
English Reading Attainment on Acquiring and Use of Information	Level 1	BR2013	33.64	31.92	12.07	<.001
		BR2016	47.15	32.81		
	Level 2	BR2013	47.13	32.90	-6.47	<.001
		BR2016	38.87	33.01		
Level 3	BR2013	33.37	31.74	-6.92	<.001	
	BR2016	24.99	29.19			
Level 4	BR2013	29.41	43.42	-3.22	<.001	
	BR2016	24.16	35.23			

#### 4. DISCUSSION AND CONCLUSION

The investigation of students' bilingual reading performance in BR 2016 indicates that there were significant improvements both in the students' Chinese and English reading comprehension performance. The students' English reading performance on BR 2016 was 79.22% of the average Chinese reading score. Compared with the students' English reading performance in BR 2013, which was 75% of the average Chinese reading test score, the gap between Chinese and English reading literacy slightly narrowed. The increase was most obvious on the students' English reading test performance as the students in BR 2016 performed significantly better than those in BR 2013 in terms of overall English reading test performance as well as on achievements of comprehending literary and informational texts.

The significant improvements in the students' performance on the overall English reading test and literary and information texts may be a positive outcome of the ten-year implementation of the English Language Curriculum (Primary 1-6) (Curriculum Development Council, 2004) since 2001. Based on the aim of promoting a learner-centered curriculum, one focus of the English Language Curriculum is to require teachers to make greater use of text types that provide students with pleasurable and enjoyable learning experiences and stimulate critical thinking (Curriculum Development Council, 2004). Teachers also need to help their students achieve familiarity with various text types and text structures. Such foci may lead to students making satisfying performances on literary and informational texts types. Other foci of teachers' and schools' roles in the curriculum include motivating learning through a variety of activities, supporting learners in constructing knowledge and developing

language skills and enhancing the learning-teaching-assessment cycle by using criterion-referenced principles in evaluating learners' achievement, all of which may contribute to students' English language development. After over a decade of endeavor, it seems that the English Language Curriculum, with specific foci and detailed criteria for its implementation, to some extent, has promoted students' English reading performance since the release of the Guide (Curriculum Development Council, 2004).

Moreover, the Standing Committee on Language Education and Research (SCOLAR), a committee established in 1996 to promote the government policy of biliteracy and trilingualism and advise on MOI and language standards at different levels of education, has organized a number of activities every year as well as provided a large amount of funding to create a diverse and ample environment for students to learn English since 2002 (Tse et al., 2014). These programs and funds may offer students opportunities to learn and use English in and out of school, a practice that had a formative influence on their learning outcomes.

Another possible reason for the significant improvement in students' English reading test performance may be the fine-tuning MOI policy (2010) in 2010, which allows individual secondary schools to decide on MOI arrangements in classes, such as English-medium classes, partial-English-medium classes and Chinese-medium classes, instead of using CMI for all content subjects as before 2010. The fine-tuning of the MOI policy implemented in secondary schools, to some extent, may have influenced MOI practices in primary schools since primary school students are always preparing for secondary education (Wang & Kirkpatrick, 2015). It is possible that some primary schools may have adopted different MOI arrangements for certain courses so as to help students who would like to study in EMI secondary schools to achieve sufficient English proficiency for an all-English curriculum. This change may produce a positive effect on primary school students' English reading performance as students have more exposure to English at school.

Noticeably, students' bilingual reading performance on literary texts is not as good as that on informational texts. Especially, compared with those in BR 2013, there were significant decreases in the students' overall performance on Chinese literary texts as well as in performance on the first three levels of reading comprehension processes in BR 2016. One reason for this may be the increasing use of digital devices among young students. The high frequency use of such devices with access to the internet makes the students receive exposure to fragmented information instead of reading books and long passages (Tse et al., 2014). Students are attracted by tables, pictures and figures in online and printed articles. When reading the content of these texts, they tend to be less motivated and interested (Tse et al., 2014). This may explain the students' decreasing reading performance on literary texts since test items on literary experience require the readers to understand its content meaning before answering. Since students may get used to shallow reading online, it would be difficult for them to concentrate while reading the literary texts with events. This may also be one reason for the declines in the first three levels of reading

comprehension processing of Chinese literary texts and the first two levels of comprehension processes for of English literacy texts. Another possible reason may be the poor performance of low achievers on these levels of reading comprehension processes. Previous research indicates that low achievers may have difficulty in integrating word-knowledge with text-based information and making inferences (Araújo et al., 2013; Cain, Oakhill, Barnes, & Bryant, 2001). Future research may be conducted to investigate whether there are significant differences between the test performance of high achievers and low achievers across levels of comprehension.

The students' frequent accesses to the digital information, to some degree, may explain their better bilingual reading performance on the informational texts in BR 2016, especially the growth of the correctness of the first two levels of comprehension processes in the English test. Since the informational texts usually contain a table to document factors or a picture to display a description (Mullis & Martin, 2015), which are similar to the information the students are exposed to online, the students are more familiar with their text structures and could efficiently locate the information relevant to the test items. However, it is noteworthy to mention that the students only made significant progress on lower levels of reading comprehension processes in the informational texts. In terms of the higher levels of reading processes, there were significant declines for students' performance on both Chinese and English informational texts. It is suggested that students' frequent accesses to the digital information may only help them enhance their low level of comprehension processes on informational texts. As for higher levels of reading processing, specific reading instruction and explicitly-taught reading comprehension strategies are needed if students are to obtain high scores on these test items. The cognitive approach to teaching reading, such as helping students find solutions to problems, encouraging group discussions about what is being taught, and asking students to justify and explain their thinking, may be a strategy that teachers could adopt to promote the development of students' higher levels of comprehension in reading classes (Tse et al., 2013).

Compared with the differences in performance on lower levels of reading processing in English literacy and informational texts, students obtained similar percentages of correctness for the first two levels of process in the Chinese literacy and informational texts. Primary school students in Hong Kong have equal exposure to literacy and informational texts in learning Chinese and have ample opportunities to select these types of books from school libraries (Tse & Xiao, 2014). Parents are also willing to read Chinese books and tell stories to their children at home (Tse et al., 2017). All of these practices may make students more familiar with frequently-used Chinese words and basic text structures. Since the implementation of the fine-tuning MOI policy, primary school students in Hong Kong have had more access to English informational texts as some of non-language content courses, such as mathematics and science, are allowed to be taught in English, which may help student learn vocabulary specific to the concepts and the text structures in informational texts. In

fact, literacy texts are only used in English lessons. Furthermore, few primary students in Hong Kong are interested in reading English novels in their leisure time (Tse et al., 2013). Thus, students may be unable to acquire specific vocabulary and knowledge of structures necessary for understanding English literacy texts, which possibly led to their poor performance and low levels of comprehension in comparison with that on comprehending informational texts.

Compared with the percentages of students who were competent in using both languages, there was a growth from 44% in BR 2013 to 8.10% in BR 2016. Meanwhile, there has also been an increase in the proportion of students with bilingual attainment over 500 (international mean) from 12.76% in BR 2013 to 22.48% in BR 2016. In terms of the percentages of students whose Chinese and English reading test performance is below the English average, the amount decreased from 5.96% in BR 2013 to 3.20% in BR 2016. All such statistical information indicates that the percentage of competent P4 bilingual students in Hong Kong may be growing slightly, which may be attributed to the implementation of the curriculum, the MOI policy and the extensive modifications of teaching and learning practices.

One limitation of the current study is that statistical analyses were only conducted to compare mean differences in students' performance of the overall bilingual reading tests and subtests across two cycles. Future studies are needed to examine whether the variables suggested above will have causal effects on students' test performance. Longitudinal studies are also recommended to explore the dynamics underpinning relationships and literacy growth.

In general, this article has examined Primary 4 students' bilingual reading test performance in BR 2016. The significant increases in the students' Chinese and English reading proficiency may shed light on MOI practices and instructional approaches in Hong Kong primary schools. These findings may also have implications for promoting bilingual education programs and curricula development in schools and in society.

#### ACKNOWLEDGEMENTS

The authors would like to thank the Research Grant Council of HK SAR for its support through General Research Fund (No.17606415). They thank the children, their parents, teachers, and school principals in the 38 schools in Hong Kong for their participation in the project. The authors would like to thank Dr. Terry Dolan for this invaluable input into the paper.

#### REFERENCES

- Araújo, L., Morais, J., & Costa, A. (2013). Assessments of reading comprehension: Different measures, different explanatory variables and achievement. *L1 Educational Studies in Language and Literature*, 13(1), 1-21. <https://doi.org/10.17239/L1ESLL-2013.01.04>

- Cain, K., Barnes, M. A., Bryant, P. E., & Oakhill, J. V. (2001). Comprehension skill, inference making ability and their relation to knowledge. *Memory and Cognition*, 29(6), 850-859. <https://doi.org/10.3758/BF03196414>
- Chan, Y. H. (2014). Fine-tuning language policy in Hong Kong education: stakeholders' perceptions, practices and challenges. *Language and Education*, 28(5), 459-476. <https://doi.org/10.1080/09500782.2014.904872>
- Cummins, J. (2000). *Language, power, and pedagogy: Bilingual children in the crossfire*. Clevedon, UK: Multilingual Matters. <https://doi.org/10.21832/9781853596773>
- Curriculum Development Council. (2004). *CDC English language curriculum guide (Primary 1-6)*. Retrieved from [http://www.edb.gov.hk/attachment/en/curriculum-development/kla/eng-edu/primary%201\\_6.pdf](http://www.edb.gov.hk/attachment/en/curriculum-development/kla/eng-edu/primary%201_6.pdf)
- Education Bureau. (2009). *Fine-tuning the medium of instruction for secondary schools* (Education Bureau Circular No. 6/2009). Hong Kong, China: Government Printer.
- Education Bureau. (2010). *Enriching our language environment, realizing our vision*. Hong Kong Education Bureau, the Government of the Hong Kong Special Administrative Region.
- Elly, W. B. (Ed.). (1993). *The IEA reading literacy study: The international report*. Oxford, UK: Pergamon Press.
- Evans, S. (2002). The medium of instruction in Hong Kong: Policy and practice in the English and Chinese streams. *Research Paper in Education*, 17(1), 97-120. <https://doi.org/10.1080/02671520110084030>
- Evans, S. (2011). Historical and comparative perspectives on the medium of instruction in Hong Kong. *Language Policy*, 10(1), 19-36. <https://doi.org/10.1007/s.10993-011-9193-8>
- Evans, S., & Green, C. (2003). The use of English by Chinese professionals in post-1997 Hong Kong. *Journal of Multilingual and Multicultural Development*, 24(5), 386-412. <https://doi.org/10.1080/01434630308666507>
- Evans, S., & Morrison, B. (2017). English-medium instruction in Hong Kong: Illuminating a grey area in school policies and classroom practices, *Current Issues in Language Planning*, 18(3), 303-322. <https://doi.org/10.1080/14664208.2016.1270106>
- Johnson, R. K., & Cheung, Y.S. (1995). *Reading literacy in HK: An IEA world literacy project on the reading proficiency of HK students in Chinese and English*. Hong Kong, China: HK University and HK Polytechnic University.
- Kan, V., Lai, K.C., Kirkpatrick, A., & Law, A. (2011). *Fine-tuning Hong Kong's medium of instruction policy*. Hong Kong, China: Research Centre into Language Education in Multilingual Societies, The Hong Kong Institute of Education.
- Kintsch, W. (1998). *Comprehension: A paradigm for cognition*. Cambridge, UK: Cambridge University Press.
- Kintsch, W., & Kintsch, E. (2005). Comprehension. In S. Paris & S. Stahl (Eds.), *Children's reading comprehension and assessment* (pp. 71-92). Mahwah, NJ: Lawrence Erlbaum Associates.
- Lao, C. (2004). Parents' attitudes toward Chinese-English bilingual education and Chinese language use. *Bilingual Research Journal*, 28, 99-121. <https://doi.org/10.1080/15235882.2004.10162614>
- International Business Machines (IBM). (2013). *IBM SPSS Statistics for Windows, Version 22.0*. Armonk, NY: IBM Cop.
- Mullis, I.V.S., & Martin, M. O. (Eds.). (2015). *PIRLS 2016 Assessment Framework (2nd ed., Rep.)*. Chestnut Hill, MA, USA: TIMSS & PIRLS International Study Center.
- Mullis, I.V.S., Martin, M.O., Foy, P., & Drucker, K.T. (2012). *PIRLS 2011 international results in reading*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.
- Mullis, I.V.S., Martin, M. O., Gonzalez, E.J., & Kennedy, A. M. (2003). *PIRLS 2001 international report: IEA's study of reading literacy achievement in primary school*. Chestnut Hill, MA: Boston College.
- Mullis, I.V.S., Martin, M.O., Kennedy, A.M., & Foy, P. (2007). *IEA's progress in International Reading Literacy Study in primary school in 40 countries*. Chestnut Hill, MA: TIMSS & PIRLS International Study Center, Boston College.
- Mullis, I. V. S., Martin, M. O., Ruddock, G. J., O'Sullivan, C. Y., & Preuschoff, C. (2009). *TIMSS 2011 assessment frameworks*. Chestnut Hill, MA: Boston College.

- Mullis, I. V. S., & Prendergast, C. O. (2017). Developing the PIRLS 2016 achievement items. In M. O. Martin, I. V. S. Mullis, & M. Hooper (Eds.), *Methods and Procedures in PIRLS 2016* (pp. 1.1-1.29). Retrieved from Boston College, TIMSS & PIRLS International Study Center website: <https://tims-sandpirls.bc.edu/publications/pirls/2016-methods/chapter-1.html>
- Pan, S.W. (2000). Hong Kong's bilingual past and present. *Intercultural Communication Studies*, 1, 57-65.
- Perfetti, C., Landi, N., & Oakhill, J. (2005). The acquisition of reading comprehension skills. In M.J. Snowling & C. Hulme (Eds.), *The science of reading: A handbook* (pp. 227-247). Malden, MA: Blackwell Publishing. <https://doi.org/10.1002/9780470757642.ch13>
- Poon, A. Y. K., Lau, C. M., & Chu, D. H. (2013). Impact of the fine-tuning medium-of-instruction policy on learning: some preliminary findings. *Literacy Information and Computer Education Journal*, 4(1), 946-954. <https://doi.org/10.20533/licej.2040.2589.2013.0138>
- Poon, A.Y. K., & Lau, C. M. Y. (2016). Fine-tuning medium-of-instruction policy in Hong Kong: Acquisition of language and content-based subject knowledge. *Journal of Pan-Pacific Association of Applied Linguistics*, 20(1), 135-155.
- Tsui, A. B. M. (1992). Using English as a medium of instruction and English acquisition. In L. K. Kwong (Ed.), *Into the twenty first century: Issues of language in Hong Kong* (pp. 135-145). Hong Kong, China: Hong Kong Linguistics Society of Hong Kong.
- Tse, S.K., Hui, S.Y., Ng, H.W., & Lam, W.I. (2014). A Comparison of Hong Kong primary 4 students' relative progress in Chinese and English reading attainment in 2013. *Quarterly Journal of Chinese Studies*, 2(3), 37-54.
- Tse, S.K., Lam, W.I., Loh, K.Y., Hui, S.Y., & Ng, H.W. (2013). A comparison of Hong Kong primary 4 students' relative progress in Chinese and English reading attainment. *Quarterly Journal of Chinese Studies*, 1(4), 1-16.
- Tse, S.K., Shum, S.K., Ki, W.W., & Wong, P.C. (2001). The transition from English to mother-tongue Chinese as medium of instruction: issues and problems as seen by Hong Kong teachers. *L1 Educational Studies in Language and Literature*, 1(1), 9-36. <https://doi.org/10.1023/A:1011512720278>
- Tse, S.K., & Xiao, X.Y. (2014). Differential influences of affective factors and contextual factors on high-proficiency readers and low-proficiency readers: a multilevel analysis of PIRLS data from Hong Kong. *Large-scale Assessments in Education*, 2(1), 1-24. <https://doi.org/10.1186/s40536-014-0006-3>
- Tse, S.K., Zhu, Y., Hui, S.Y., & Ng, H. W. (2017). The effects of home reading activities during preschool and Grade 4 on children's reading performance in Chinese and English in Hong Kong. *Australian Journal of Education*, 61(1), 5-23. <https://doi.org/10.1177/0004944116689093>
- van Dijk, T., & Kintsch, W. (1983). *Strategies of discourse comprehension*. New York, NY: Academic Press.
- Wang, L., & Kirkpatrick, A. (2015). Trilingual education in Hong Kong primary schools: An overview. *Multilingual Education*, 5(3), 1-26. <https://doi.org/10.1186/s13616-015-0023-8>
- Zhang, B.N., & Yang, R. (2004). Putonghua education in Hong Kong. In M.L. Zhou & H.K. Sun (Eds.), *Language policy in the People's Republic of China* (pp. 151-161). Norwell, MA: Kluwer Academic Publishers.