Bilingual Education Policy in Singapore: An Analysis of its Sociohistorical Roots and Current Academic Outcomes

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Using available data from Singapore’s national census and economic reports, national exams, international comparison studies and small-scale studies, this paper examines the sociohistorical circumstances that led to the creation of Singapore’s bilingual education policy, the results of this policy on recent academic achievement and implications for second language acquisition theory. National exam data reveal increasing levels of achievement for students in most academic areas; however, an achievement gap persists among ethnic groups. International comparisons indicate Singapore’s superiority in math and science achievement and comparability in reading relative to participating countries. Little data are available on the degree of bilingualism of Singaporean students; however, the few published studies indicate English dominance in literacy but Mandarin dominance in oral communication for most Singaporean students. Singapore’s success in educating students through a second language challenges the assumption of the supremacy of instruction through the home language but may lend support to the interdependence hypothesis.

Keywords: bilingual education, biliteracy, language policy, language shift, Singapore

Singapore’s education system has been hailed as a great success due to its first-place mean score in maths (Mullis et al., 1999a) and second place in science (Martin et al., 1999) of 38 countries on the Third International Math and Science Study-Repeat (TIMSS-R). These results would be impressive in any country, but they are particularly remarkable for Singapore because all students are schooled (and tested) in English, which is not the predominant home language for most students. Singapore’s language-in-education policy, however, is officially bilingual: from the start of schooling, English is the medium of all content-area instruction but students are also required to study their official ‘Mother Tongue’ as a single subject. The government assigns students a ‘Mother Tongue’ based on ethnicity, regardless of the student’s home language, resulting in some students studying two non-native languages in school. How did this unusual policy arise? Does the evidence indeed support the perception of the Singapore system as successful, in comparison with other countries as well as by internal measures? Are students of all ethnic groups equally successful under this system?

In this paper, I examine the historical circumstances that gave rise to this unique policy, analyse the available data on student academic achievement and proficiency in English and students’ Mother Tongue, and report the evidence available concerning students’ degree of bilingualism and biliteracy.
Using data from Singapore’s Ministry of Education on national exam results, as well as results from the International Association for the Evaluation of Educational Achievement (IEA) studies Third International Math and Science Study (TIMSS), Third International Math and Science Study-Repeat (TIMSS-R), Reading Literacy Study (RLS) and Progress in Reading Literacy Study (PIRLS), and the few smaller-scale studies available, I evaluate how well students learn subject-matter material in English and how proficient they become in English and Mother Tongue.

Theoretical Background

The interdependence hypothesis of second language acquisition suggests that a strong basis in one’s first language (L1) serves as the best foundation for high achievement in a second language (L2), and that a successful bilingual programme should provide for the development of academic skills and concepts in both languages (Cummins, 1978, 1979, 2000). Many researchers also contend that literacy and basic concepts are best developed in a child’s L1 for optimal literacy and schooling success (Gonzalez, 1998; Tucker, 2001). Understanding and producing oral language has been established as an important predictor of reading proficiency among monolingual students (Snow et al., 1998); hence, students with lower home exposure to and use of the language of instruction would be predicted to have poor educational outcomes. In fact, in most countries around the world in which a former colonial language has been adopted to educate a majority who do not speak that language, students experience high dropout rates and high levels of failure to achieve even basic academic outcomes (see Hovens, 2002; Mazrui, 2002; UNESCO, 2000). Singapore’s excellent educational outcomes through L2-medium instruction from the beginning of schooling, challenges the assertion of the supremacy of L1 schooling.

The development of Singapore’s bilingual education policy, 1965 to the present

Ethnolinguistic context of Singapore

Singapore is comprised of three major ethnic groups, in the following proportions: 77% Chinese, 14% Malay and 8% Indian (Singapore Department of Statistics, 2002); proportions that have remained relatively stable since around 1900 (Chua, 1964). Before adoption of the first bilingual education policy in 1966, Singaporeans spoke a wide variety of home languages. The Chinese ethnic group spoke about ten different ‘dialects’ of Chinese, with Hokkien, Teochew and Cantonese together comprising around 80% of Chinese speakers (Chua, 1964). The so-called Chinese ‘dialects’ share a common written form but are not mutually intelligible, leading many linguists to classify them as separate Sinitic languages within the Sino-Tibetan language family (Arendrup, 1994). The Indian ethnic group spoke a variety of languages from two different language families (Dravidian and Indo-European), with the majority speaking the Dravidian language Tamil and most others speaking Malayalam, Punjabi, Gujarati, Bengali or Telegu (Chua, 1964). The majority of
Malays spoke Malay, but Javanese and Boyanese were also spoken by a sizeable minority of ethnic Malays.

The economic, social and political situation at independence

Lee Kuan Yew, Prime Minister of Singapore from independence in 1965 until 1990, cites economic reasons as the impetus behind the nation’s retention of English as an official language in newly independent Singapore and the government’s encouragement of English as the language of interethnic communication (Lee, 2000). A former British colony, Singapore never intended to be an independent city-state; rather, it became part of Malaysia in 1963 and meant to remain united with its larger neighbour. However, arguments erupted over the rights of ethnic Chinese citizens in the new nation, leading to Malaysia’s expulsion of Singapore in 1965. As a tiny port city with no natural resources, Singapore faced a serious crisis.

At independence, Singapore’s economy was dependent on trade, mostly importing, processing and then exporting other countries’ goods (Singapore Government, 1965). Indonesia, until 1965 Singapore’s second-largest trading partner, had imposed a trade embargo on Singapore due to increased hostility between Indonesia and Malaysia (Yip et al., 1990); consequently, Singapore’s entrepôt trade dropped by 23% (Singapore Government, 1966). Additionally, Malaysia was developing its own ports to handle its imports and exports and to compete with Singapore for international trade. Also, an estimated 7.4% of the population in 1965 was unemployed, a majority of them young people (Singapore Government, 1966). With over half of the population in 1965 under the age of 20, the problem of youth unemployment was serious, demanding job-creation rates of at least 3% a year simply to keep the unemployment rate stable.

Social conditions also threatened to destabilise the fledgling nation. The British had kept the three major ethnic groups geographically and ethnically divided (Kwan-Terry, 2000). During disputes with Malaysia in 1964 over new laws for the union with Singapore, race riots broke out in Singapore between Malays and Chinese (Lee, 2000). How could a tiny, fractious nation, plagued by poverty and unemployment, survive with hostile neighbours? And how would the sensitive issue of language be dealt with in this fragile, multilingual, racially divided city-state?

First, Singapore chose to become an officially multilingual state, selecting four official languages: English, Mandarin Chinese, Malay and Tamil. English was promoted as a ‘neutral’ language for interethnic communication, whereas the three other official languages were designated the ‘Mother Tongues’ of the major ethnic groups (Kuo, 1980). The choice of these ‘Mother Tongues’ was politically motivated (Puru Shotam, 1989). At the time of independence, virtually no ethnic Chinese in Singapore spoke Mandarin as their predominant home language (Chua, 1964), although Mandarin was well established as the language of Chinese education (De Souza, 1980). Additionally, only about 60% of Indians in Singapore in 1957 spoke Tamil as their home language, and around 70% of Malays spoke Malay at home (Chua, 1964).

Second, the Singapore government established a bilingual education policy. Although the prime minister of this new nation determined that only mastery
of the English language would bring Singapore the international trade, investment and access to Western science and technology it needed, he knew for political reasons that he could not make the switch quickly:

To announce that all had to learn English when each race was intensely and passionately committed to its own mother tongue would have been disastrous.... Not wanting to start a controversy over language, I introduced the teaching of three mother tongues, Mandarin, Malay, and Tamil, into English schools. This was well received by parents. To balance this, I introduced the teaching of English in Chinese, Malay, and Tamil schools. Malay and Indian parents welcomed this but increasing numbers preferred to send their children to English schools. A hard core of the Chinese-educated did not welcome what they saw as a move to make English the common working language, and they expressed their unhappiness in the Chinese newspapers. (Lee, 2000: 146)

Thus, all Singapore students were required to study two of the official languages. However, even in 1965, enrolment in English-medium schools had been increasing for some time, with accompanying declines in Malay-, Tamil- and Chinese-medium schools (Chiew, 1980). By independence, the majority of Singaporean primary students (57%) were already enrolled in English-medium schools (Khoo, 1983).

Transition to English-medium education for all

To ease the transition to English-medium education further, the government required all schools to teach math and science in English starting with Primary 1 (equivalent to first grade) in 1966 (Yip et al., 1990). By 1975, no new students started Primary 1 in Tamil-medium schools (Chiew, 1980). By 1983, parents stopped enrolling their children starting Primary 1 in Malay-medium schools, and Chinese-medium enrolment had declined to less than 1% of the entire entering Primary 1 cohort (Gopinathan, 1999). Malay- and Tamil-medium schools started to close, first the primary, then the secondary and finally tertiary institutions (Kamsiah & Bibi, 1999).

With few students left in Malay-, Tamil- or Chinese-medium schools, the government announced in 1983 that all students would be taught all their content in English by 1987, with Chinese, Malay or Tamil as a required subject (Gopinathan, 1999). More recently, for Indians who speak Indo-European languages at home, Hindi, Punjabi, Bengali, Urdu and Gujarati are offered as options for Mother Tongue study outside school in classes offered by community groups on weekends (Saravanan, 1999). With an area only 3.5 times the size of Washington, DC (CIA, 2001), Singapore’s diminutive size and efficient public-transit infrastructure allows for easy consolidation of students who speak lower-incidence Indian languages for instruction. Though the government offers these languages as subjects in the national examinations, it does not fund or provide facilities, teachers or teacher training for classes in these nonofficial languages (Kaur & On, 2001).

The history of English education in Singapore

English was the native language of virtually none of the Singapore population in 1965 (Arumainathan, 1970). However, English education, which
had been limited by the British to the number of ‘natives’ needed to fill clerical and other administrative posts (Kwan-Terry, 2000), offered economic rewards (Clark & Pang, 1980). In 1957, about 25% of Singaporeans reported being able to speak English (Chua, 1964), though how proficiently is unknown. Overall, about half of the Singapore population reported literacy, defined as being able to read and write a simple letter, in some language in 1957; 21% of the Singapore population reported being literate in English, while 27% reported basic literacy in Mandarin. Although English had little basis in a specific Singaporean community, its high status and international economic value allowed it to be accepted as the main medium of education in Singapore (Lee, 2000).

**The promotion of Mandarin in Singapore**

Around 1979, the Singapore government officially promoted the use of Mandarin, rather than Chinese dialects, among ethnic Chinese Singaporeans (Kuo, 1984; Newman, 1988). Using television, newspaper, radio and billboards, the government sent out the message to the Chinese to use Mandarin and also provided lessons in Mandarin (Kuo, 1984). At the same time, the government phased out television and most radio programming in Chinese dialects and began dubbing television programmes and films from Hong Kong (originally in Cantonese).

**Current sociolinguistic context of Singapore**

Exact language-use patterns are difficult to document, as few observational studies on Singaporean language use have been conducted. However, numerous questionnaires and informal observations confirm census data that indicate major language shifts away from vernaculars toward English and other official languages, particularly Mandarin for the Chinese (e.g. Kwan-Terry, 2000; Riney, 1998). According to the 2000 census, Malay use of their Mother Tongue continued to be the highest of the ethnic groups (see Table 1), with 91.6% reporting using Malay as the predominant home language (Singapore Department of Statistics, 2002). Most of the rest of the Malays (7.9%) reported speaking English most frequently at home in 2000. Similarly, over 90% of Malay children aged 5–14 (the age group best describing primary and secondary students) reported speaking Malay at home, with about 9% using English (Singapore Department of Statistics, 2000). Literacy in Malay also remained high, with 76.7% literate in Malay and English, and 19.8% literate in Malay only in 2000 (see Table 2; Singapore Department of Statistics, 2001).

The Indian community has experienced the greatest shift away from vernaculars, although statistics for predominant home language seem to have stabilised for Tamil and ‘other’ Indian languages over the last decade (see Table 1). According to the 2000 census, only 42.9% of Indians spoke Tamil as their predominant home language, while 35.6% spoke English and less than 10% of the Indian population spoke languages other than the official languages of English, Malay and Tamil (Singapore Department of Statistics, 2002). Tamil and English use among children aged 5–14 are essentially the reverse of the overall figures, at 36.3% and 43.6%, respectively, in 2000 (Singapore Department of Statistics, 2000). Literacy in Tamil was down to
### Table 1

This table displays the percentage of each ethnic group who speak the listed language most frequently at home, by age group, 1990 and 2000.

<table>
<thead>
<tr>
<th>Ethnic group/language</th>
<th>Overall (%)</th>
<th>Age 5–14 (%)</th>
<th>Age 15–24 (%)</th>
<th>Age 25–39 (%)</th>
<th>Age 40–54 (%)</th>
<th>Age 55 and over (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chinese</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>19.3</td>
<td>23.9</td>
<td>23.3</td>
<td>35.8</td>
<td>19.9</td>
<td>21.5</td>
</tr>
<tr>
<td>Mandarin</td>
<td>30.1</td>
<td>45.1</td>
<td>57.6</td>
<td>59.6</td>
<td>28.5</td>
<td>59.8</td>
</tr>
<tr>
<td>Chinese dialects</td>
<td>50.3</td>
<td>30.7</td>
<td>18.9</td>
<td>4.3</td>
<td>51.5</td>
<td>18.4</td>
</tr>
<tr>
<td>Other</td>
<td>0.3</td>
<td>0.4</td>
<td>0.2</td>
<td>0.4</td>
<td>0.2</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Malays</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>6.1</td>
<td>7.9</td>
<td>8.3</td>
<td>9.4</td>
<td>7.0</td>
<td>8.2</td>
</tr>
<tr>
<td>Malay</td>
<td>93.7</td>
<td>91.6</td>
<td>91.6</td>
<td>90.1</td>
<td>92.9</td>
<td>91.3</td>
</tr>
<tr>
<td>Other</td>
<td>0.1</td>
<td>0.5</td>
<td>0.1</td>
<td>0.5</td>
<td>0.1</td>
<td>0.5</td>
</tr>
<tr>
<td><strong>Indians</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>English</td>
<td>32.3</td>
<td>35.6</td>
<td>39.6</td>
<td>43.6</td>
<td>37.0</td>
<td>37.9</td>
</tr>
<tr>
<td>Malay</td>
<td>14.5</td>
<td>11.6</td>
<td>18.4</td>
<td>12.9</td>
<td>15.1</td>
<td>14.7</td>
</tr>
<tr>
<td>Tamil</td>
<td>43.2</td>
<td>42.9</td>
<td>35.6</td>
<td>36.3</td>
<td>41.0</td>
<td>40.6</td>
</tr>
<tr>
<td>Other</td>
<td>10.0</td>
<td>9.9</td>
<td>6.3</td>
<td>7.2</td>
<td>6.9</td>
<td>6.7</td>
</tr>
</tbody>
</table>

**Note:** Percentages do not always add up to 100% due to rounding.

**Source:** Singapore Department of Statistics (2000).
8.9%, while literacy in English and Tamil was up to 37.5% in 2000 (see Table 2; Singapore Department of Statistics, 2001); however, Tamil literacy has taken on a purely academic function, with Indian children studying it for examination purposes but finding little use for it in their everyday lives (Saravanan, 1999).

In a participant-observation study of ethnic Tamil Indians in a Tamil-dominated neighbourhood of Singapore, Saravanan (1999) found that Tamil maintains a role in religious and cultural events and in local transactions among Tamil Indians. However, the more educated the Indians were, the more English they used with each other and with other ethnic groups. Lower-skilled workers used Malay as the interethnic language.

The Chinese have shown the most dramatic shift over the years from Chinese dialects to Mandarin and English. In 2000, 45.1% of Chinese reported using Mandarin as their main home language (see Table 1), with 30.7% reporting Chinese dialects and 23.9% reporting English (Singapore Department of Statistics, 2002). However, the figures for Mandarin and English use at home are much higher for Chinese children aged 5–14, at 60% and 36%

Table 2 This table presents the percentage of the literate in each ethnic group by language or languages of literacy, 1970–2000

<table>
<thead>
<tr>
<th>Ethnic group and language(s) literate in</th>
<th>1970</th>
<th>1980</th>
<th>1990</th>
<th>2000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chinese</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Chinese only</td>
<td>54.2%</td>
<td>48.8%</td>
<td>40.6%</td>
<td>32.0%</td>
</tr>
<tr>
<td>English only</td>
<td>31.6%</td>
<td>20.7%</td>
<td>19.8%</td>
<td>16.4%</td>
</tr>
<tr>
<td>English and Chinese only</td>
<td>11.8%</td>
<td>28.3%</td>
<td>37.8%</td>
<td>48.3%</td>
</tr>
<tr>
<td>Others</td>
<td>2.4%</td>
<td>2.2%</td>
<td>1.9%</td>
<td>3.3%</td>
</tr>
<tr>
<td>Malays</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Malay only</td>
<td>56.5%</td>
<td>36.5%</td>
<td>27.3%</td>
<td>19.8%</td>
</tr>
<tr>
<td>English only</td>
<td>8.1%</td>
<td>2.9%</td>
<td>3.2%</td>
<td>2.0%</td>
</tr>
<tr>
<td>English and Malay only</td>
<td>34.7%</td>
<td>59.7%</td>
<td>68.1%</td>
<td>76.7%</td>
</tr>
<tr>
<td>Others</td>
<td>0.7%</td>
<td>0.9%</td>
<td>1.4%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Indians</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
<td>100.0%</td>
</tr>
<tr>
<td>Tamil only</td>
<td>27.1%</td>
<td>19.5%</td>
<td>14.5%</td>
<td>8.9%</td>
</tr>
<tr>
<td>English only</td>
<td>28.6%</td>
<td>20.0%</td>
<td>22.1%</td>
<td>21.5%</td>
</tr>
<tr>
<td>English and Tamil only</td>
<td>19.1%</td>
<td>28.1%</td>
<td>31.5%</td>
<td>37.5%</td>
</tr>
<tr>
<td>English and Malay only</td>
<td>9.4%</td>
<td>15.8%</td>
<td>19.1%</td>
<td>17.4%</td>
</tr>
<tr>
<td>Others</td>
<td>15.8%</td>
<td>16.6%</td>
<td>12.8%</td>
<td>14.6%</td>
</tr>
</tbody>
</table>

Literacy is defined as being able to read a newspaper in the specific language with understanding.

respectively, demonstrating a large shift away from Chinese dialects for school-aged children (Singapore Department of Statistics, 2000). 48.3% of Chinese reported literacy in Mandarin and English, while 32% reported literacy in Mandarin only (see Table 2; Singapore Department of Statistics, 2001).

A mid-1996 sociolinguistic survey of Chinese Singaporeans confirmed the language shifts indicated by the census data (Xu et al., 1999). To create a representative sample, 915 questionnaires were taken from the total of 2778 to reflect the occupation distribution of Chinese reported in the 1990 census. The questionnaire, in Mandarin and English, asked about usual language use, language use for specific speech events, language attitudes, codemixing, the function of Mandarin and demographic information. Fieldwork observation in 14 locations in the four most populous residential areas was undertaken at the same time as the questionnaires were being distributed. Three thousand, four hundred and forty people were observed speaking in public places; the ethnicity, age group and sex of the interlocutors were noted, along with the language used, the setting and the type of interaction. The observational data confirmed the questionnaire data (Xu & Tan, 1996).

Overall, 64% of respondents reported using Mandarin (see Table 3), 45% reported using English, and 34% reported using dialects as at least one of the languages used in daily activities for all domains of use (Xu et al., 1999). In the home, 58% reported using Chinese dialects, 47% Mandarin and 25% English at least ‘some of the time’. Comparing these figures with the census data on predominant home language suggests that many more Chinese use dialects at home in combination with Mandarin or English than use Chinese dialects as their main means of home communication.

At work, 81% reported using Mandarin, 57% English and 46% Chinese dialects as at least one regularly-used language (Xu et al., 1999). With more Chinese reporting using Mandarin than English on the job, these figures cast

<table>
<thead>
<tr>
<th>Domain of language use</th>
<th>Mandarin (%)</th>
<th>English (%)</th>
<th>Dialects (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall (all domains)</td>
<td>64.0</td>
<td>45.0</td>
<td>34.0</td>
</tr>
<tr>
<td>Work domain</td>
<td>81.0</td>
<td>57.0</td>
<td>46.0</td>
</tr>
<tr>
<td>Home domain</td>
<td>47.0</td>
<td>25.0</td>
<td>58.0</td>
</tr>
<tr>
<td>Friendship domain</td>
<td>70.0</td>
<td>39.0</td>
<td>51.0</td>
</tr>
<tr>
<td>Street domain</td>
<td>71.0</td>
<td>35.0</td>
<td>25.0</td>
</tr>
<tr>
<td>Business domain</td>
<td>64.0</td>
<td>52.0</td>
<td>13.0</td>
</tr>
<tr>
<td>Government domain</td>
<td>51.0</td>
<td>63.0</td>
<td>8.0</td>
</tr>
</tbody>
</table>

*Note:* percentages add up to greater than 100% because respondents checked all languages used in each specified domain.

*Source:* Xu et al. (1999).
some doubt on the touted supremacy of English as the ‘working language’ of Singapore. Where Chinese work mostly with other Chinese, it appears that Mandarin and/or Chinese dialects may play an important role in working life. Looking at the data for the domains of friendship, street, business and government, the authors concluded that Mandarin and English are used more in public settings, while Chinese dialects are used more in private (see Table 3). When asked if they would like their children to learn a Chinese dialect, 75% of respondents said yes; only 9% said no, with 16% expressing no opinion on the question (Xu et al., 1999).

In a 1998 study of Singaporean university students studying Japanese, students were asked to rate their use of English, Mandarin and Chinese dialects using a 5-point Likert scale (Okita & Guo, 2001). These top-tier second- and third-year university students, who had made it through the very competitive Singapore school system to university, reported using Mandarin ($M = 3.82$) a bit more than English ($M = 3.10$) at home, with Chinese dialects ($M = 3.35$) in between. These results, which only apply to successful students in the Singaporean school system, suggest that such elite students spoke a mixture of Mandarin, Chinese dialects and English at home in roughly equal proportions. It should be noted, however, that the reliability of self-report data on frequency of language use is highly questionable (Romaine, 1995).

From virtually no native speakers of English and Mandarin at independence, Singapore reported in 2000 that 23% of its population spoke English as their predominant home language (see Table 1) and 35% spoke Mandarin Chinese as their main home language (Singapore Department of Statistics, 2002). The figures for the school-aged population were even more stunning, with about 40% of all Singaporean children aged 5–14 reporting English as their predominant home language, while nearly 60% of Chinese aged 5–14 reported Mandarin as their main home language (Singapore Department of Statistics, 2000). Although these data are based on self-report, both informal observation and more formal sociolinguistic surveys have confirmed these language shifts over the decades (Kwan-Terry, 2000; Riney, 1998).

Overall, the data indicate that Singaporeans have shifted in their language use, from mostly vernacular languages to more use of English and the other official languages, especially Mandarin for the Chinese. Both census and survey data, however, do not indicate how proficient Singaporeans are in their new languages. Although a growing percentage of children aged 5–14 have been reporting English as their predominant home language, it is still the case that the majority in each ethnic group reported languages other than English as their predominant home language. This fact makes the students’ excellent results on international comparison studies, discussed in the next section, all the more remarkable.

**Academic results of Singapore’s language-in-education policy**

Singapore’s bilingual education policy did not result in high levels of English language proficiency overnight. The 1978 Goh Report decried the lack of English proficiency among Singaporean schoolchildren, citing a 1975 Ministry of Education study indicating that 33% of English-medium and
25% of Chinese-medium Primary 6 (sixth grade) pupils did not meet minimum literacy standards (Goh, 1979). Two studies around that time also emphasised students’ low levels of English proficiency (Moore, 1982; Tan, 1978).

In a 1979 study of 198 Primary 5 (fifth grade) students chosen randomly from four Singapore schools, Moore (1982) found Singaporean students scored a grade equivalent of 3.1–3.9 on the Comprehensive Test of Basic Skills (CTBS) Reading Vocabulary and Reading Comprehension subtests. Considering that the test was normed on native-English speaking Americans, Moore concluded that Singaporean students were learning to read English quite well. However, she notes that Singaporean teachers and principals were embarrassed by the scores being two grade-levels below Americans and asked for strategies to teach their students to read better in English.

A 1978 study of Chinese Secondary 4 (10th grade) students in Singapore revealed problems with Chinese-medium students’ acquisition of English (Tan, 1978). Students attending Chinese-medium schools that were entirely separate from other language mediums performed better overall on measures of oral and written English proficiency than Chinese-medium students who attended school in the same building as English-medium students. Further, exposure to and use of English was found only to have a significant effect on students’ oral English skills, not their written skills.

Overall results

Since 1996, about 96% of Singaporean primary school students have passed their Primary School Leaving Exam (PSLE) each year and become eligible for secondary education (see Figure 1). Students take this exam after six years of primary school to demonstrate they have attained basic skills in English, Mother Tongue and mathematics (Ministry of Education, 2000b). Those who do not pass generally repeat Primary 6 (sixth grade), while those who fail on the second try leave school for vocational training (Ministry of Education, 2001a). Only one-half percent of PSLE takers in 2002 were referred to vocational training (Ministry of Education, 2002b). Although all ethnic groups have a high rate of qualifying for secondary school, the rates in 2001 varied from a low of 92.0% of Malay students to a high of 98.4% of Chinese students (Ministry of Education, 2002a). The gap between the Chinese and the Malays and Indians has narrowed since 1991.

In 2001, 62% of students from Primary 6 each year entered the Special or Express streams which lead to the Singapore-Cambridge General Certificate of Education (GCE) Ordinary level (O-level) exams after four years of secondary school (Ministry of Education, 2001b). The rest entered the Normal-Academic or Normal-Technical streams. In 2001, about half of the Normal stream students took the O-levels after a fifth year of study. O-level results, therefore, already exclude about the bottom 20% of students. Students must pass five O-level exams to attend preuniversity or polytechnic courses. Overall, 25–30% of O-level students are permitted to enter GCE Advanced level (A-level; preuniversity) preparation courses, while 40% are admitted to polytechnics, which lead either to university or employment (Ministry of Education, 2002c). However, the rates of five O-level passes for each ethnic group are strikingly
different (see Figure 1). A little over half (56.5%) of the Malays and 70.3% of the Indians who took the O-levels qualified for preuniversity or polytechnics in 2001, whereas 84.3% of Chinese qualified (Ministry of Education, 2002a). Although eligibility has been rising gradually for all ethnic groups over the last decade, only the gap between the Chinese and Indians has narrowed.

The percent of the Primary 1 (first grade) cohort admitted to all postsecondary institutions, both the preuniversity courses and the technical courses, has been steadily climbing since 1991 (see Figure 2). However, a large gap remained in 2001 between the percentage of Chinese (83.6%) and both Malays (67%) and Indians (69%) who were admitted to postsecondary education (Ministry of Education, 2002a).

**Maths and science**

Singapore ranked first in maths (Mullis et al., 1999) and second in science (Martin et al., 1999a) compared to 38 countries on IEA’s Third International Math and Science Study-Repeat (TIMSS-R). The TIMSS-R results confirmed Singapore’s high scores from the previous TIMSS in 1995. These studies were conducted in the language of instruction for each country, i.e. English for Singapore.

A total of 4966 Secondary 2 (eighth grade) students from all Singapore schools participated in TIMSS-R (Mullis et al., 1999). Although secondary students are ‘streamed’ or tracked into four different streams (Special, Express, Normal-Academic and Normal-Technical), students from all streams, including the Normal-Technical stream, were proportionally represented in the TIMSS-R study (Ministry of Education, 2001d). Only 27% of Singapore’s
students reported ‘always using the language of the test (i.e. English) at home’ (Ministry of Education, 2001d: 5), whereas three-quarters of participating countries had 80% or more of their students speaking the language of the test at home (Ministry of Education, 2001d; Mullis et al., 1999). Because the 1995 TIMSS tested several grades including Primary 4 (fourth grade), it was possible to track how the Primary 4 cohort performed four years later, at Secondary 2 (the only grade tested by TIMSS-R). The Singaporean Primary 4 cohort held its top rank in mathematics by Secondary 2; however, they improved their science score from about average to the top (Ministry of Education, 2001d). Besides calculating the mean score, TIMSS-R analysed the proportion of students that reached international benchmarks. For Singapore, 46% of its students reached the top 10% benchmark, meaning almost half of Singaporean students performed as well as or better than 90% of the students of all 38 participating countries combined (Mullis et al., 1999). Additionally, 75% of Singaporean students reached the upper-quarter benchmark and fully 93% of their students met the median benchmark. In other words, 93% of Singapore’s students did as well or better than half of the students in all other participating countries combined. Virtually all Singaporean students reached at least the lower-quarter benchmark. By contrast, 9% of US students reached the 10% benchmark, 28% reached the upper-quarter benchmark, 61% reached the median and 88% reached the bottom-quarter benchmark. Strict standards for population selection, testing conditions and quality control were observed by IEA in order to ensure the best possible comparison across nations (Martin et al., 1996).
TIMSS and TIMSS-R did not collect data that would indicate whether students of different ethnic backgrounds perform differently in maths and science. However, the Singapore Ministry of Education releases some of its exam results disaggregated by ethnic group (see Figure 3). The PSLE results released refer to the top two streams of primary school, which encompassed 94% of all students in 2001 (Ministry of Education, 2001b), because the students in the lowest stream take a more basic exam (Ministry of Education, 2000b). These subject-matter exams are conducted in English in Singapore. At the end of elementary school in 2001, 90.2% of Chinese passed the maths exam, compared to 69.0% of Indians and 57.2% Malays (Ministry of Education, 2002a), although the gap has narrowed between the Chinese and both Indians and Malays since 1991. PSLE results showed less of a gap between Chinese (94.5% passed in 2001) and both Indians (84.1%) and Malays (76%) in science (Ministry of Education, 2002a). Singapore’s Ministry of Education reported that the dip in subject-exam pass rates in 2001 over 2000 is due to a larger base of students taking the exams after changes in the criteria for promotion from Primary 5 to Primary 6 (Ministry of Education, 2002a). A similar gap in maths existed in 2001 between Chinese (91.0%) and Indians (73.5%) and Malays (64.1%) who took the O-level exams (see Figure 4; Ministry of Education, 2002a). The gap between Chinese, on the one hand, and Indians and Malays, on the other, may be explained by differences in family income or profession. The 2000 census data (Singapore Department of Statistics, 2002) indicate that the median household income for Chinese families (S$3848) is higher than that of Malays (S$2708) or Indians (S$3387). In addition, a higher percentage of

Figure 3 The graph depicts the percentage of each ethnic group (Chinese, Malay and Indian) that passed the PSLE maths and science subject tests. Source: Ministry of Education (2001c, 2002a).
Chinese (46.2%) occupy professional, technical and managerial positions than Malays (23.4%), though not much more than Indians (43.3%). Households with higher incomes may contain more educated parents who can more effectively help children with their studying; in addition, higher disposable income may allow more Chinese families to hire tutors to aid their children’s learning.

English proficiency

Overall, 97.7% of Singaporean students in the top two primary streams passed the English exam on the PSLE in 2001 (Ministry of Education, 2002a), with little variability by ethnic group (95.7% of Malays, 98.0% of Chinese and 98.2% of Indians). In other words, for the approximately 95% of Singaporean students who make it into the regular and elite tracks for upper primary school, virtually all of them pass their English exam, regardless of ethnicity. These data provide evidence that English may function as a ‘neutral’ language, giving no ethnic group an advantage, at least at the primary level. Students in the bottom stream take a ‘Foundation English’ exam (Ministry of Education, 2000b) and are not included in this figure (Ministry of Education, 2002a).

What happens at the secondary level? Recalling that approximately 20% of students do not take the O-levels at all, it is noteworthy that a disparity between the ethnic groups exists on the English exam (see Figure 5), which includes oral, aural, reading comprehension, vocabulary and writing components. Over the years, Indians have consistently outperformed other ethnic
groups on the English O-level exam (Ministry of Education, 1997); in 2001, about 87% of Indians passed English, whereas 80.4% of Chinese and only 70.9% of Malays passed (Ministry of Education, 2002a). All ethnic groups have improved their pass rates since 1988 (Ministry of Education, 1997; 2002a), with the gap between the ethnic groups narrowing as well. More Indians and Malays pass their English O-level exam than pass a total of five content-area O-level exams (compare Figures 1 and 5), indicating that English proficiency alone is not sufficient for academic success in Singapore. Perhaps once a baseline level of English proficiency is reached, instruction is accessible to students in Singapore, and additional knowledge of English grammar and composition does not enhance attainment of subject-area concepts and skills.

Only the most academically able prepare for A-level exams, the top 25–30% of a cohort of students (Ministry of Education, 2002c). Most students do not take the English literature exam, but all must pass the General Paper (GP), technically an ‘AO’-level exam, to qualify for university. The GP consists of general English reading comprehension questions with one long essay on a social or political topic, so GP results may be used as a measure of English reading and writing skills. At this high level, all three ethnic groups post high pass rates. Since 1991, 80–85% of Malays, 90–96% of Indians and 86–92% of Chinese have passed their GP (see Figure 5). For Chinese and Indians, achievement seems to have levelled off after a decline from highs in 1994,
whereas Malay performance has fluctuated with a tentative upward trend since 1994 interrupted by a major dip in 2000.

Another source of evidence as to how well Singaporean students are learning to read in English is the 35-country IEA Progress in International Reading Literacy Study (PIRLS) 2001, which tested 10-year-olds (with four years of schooling) on reading for literary purposes and reading for informational purposes (Mullis et al., 2003). The tests were administered in the language of instruction of each country, i.e. English for Singapore. Overall, Singapore’s Primary 4 (P4) students scored significantly higher than the international average and 15 countries, not significantly different from Scotland, New Zealand and six other nations, and significantly lower than England, the USA and nine other countries. On items measuring reading for both literary and informational purposes, Singapore performed significantly better than 15 countries, and did not significantly differ from 11 and 12 countries, respectively, including the USA on reading for informational purposes. Singapore, at 43%, was one of only four countries in which less than half of their students ‘always’ or ‘almost always’ spoke the language of the test at home. Despite the status of English as a nonpredominant home language for the majority of Singaporean students, Singapore’s scores compare favourably to countries in which the majority of students speak the language of instruction at home.

The 1991 32-country IEA Reading Literacy Study (RLS) examined reading comprehension of 9-year-old (third grade) and 14-year-old (eighth grade) students using three tests: a narrative text, an expository text and documents, such as a map, time schedule, etc. (Elley, 1992). The scores were scaled to reflect an international average of 500 with a standard deviation of 100. Fourteen-year-old Secondary 2 (S2) students in Singapore, with only 26% reporting they ‘always’ or ‘almost always’ used the language of the test at home, earned an average score ($M = 534, sd = 66$) almost the same as the USA ($M = 535, sd = 85$), with a smaller standard deviation, and outsored Ireland ($M = 511, sd = 81$) and the only province of Canada to participate, British Columbia ($M = 522, sd = 81$). Singapore’s performance demonstrates English reading proficiency matching and even surpassing mostly monolingual native English-speaking countries. In the same study, Singapore’s 9-year-old Primary 3 (P3) students achieved a mean score of 515 ($sd = 72$), again outscoring Ireland ($M = 509, sd = 79$) and British Columbia ($M = 500, sd = 80$). Ten years later, as a part of PIRLS, Singapore and eight other countries tested a sample of 9-year-olds on the same tests as the 1991 RLS to discover any progress made (Martin et al., 2003). Singapore’s Primary 3 (P3) students posted a scaled mean score 8 points higher than but not significantly different from P3 scores in 1991.

In a substudy of social inequality and literacy outcomes, the overall mean reading scores of 22 countries from the RLS were compared (Raudenbush et al., 1996). In their model, Singapore’s mean literacy score was almost perfectly predicted by its per-capita GNP. In other words, Singaporean students were reading at the average for countries of their relative wealth, despite being schooled and tested in a medium not used as the predominant home language for the majority.
IEA uses strict standards in its studies (PIRLS, RLS and TIMSS) to ensure that a representative population is selected and that testing conditions are as uniform as possible across the participating countries (Martin et al., 1999b). Although Singapore did not stand out as a top-scorer in reading as demonstrated by PIRLS and RLS scores as it did in maths and science on TIMSS, Singapore scored above the international mean and above its predicted score based on economic, social and linguistic characteristics of the population (Elley, 1992). Singapore was one of the few countries that tested a majority of its students in a non-native medium.

Degree of biliteracy

Little data is available on students’ performance in their home languages. The most direct data come from the Ministry of Education’s published pass rates for the different ethnic groups on their Mother Tongue exams, which is often but not always the students’ predominant home language. On the PSLE, the vast majority of students in the top two streams pass their Mother Tongue exam; in 2001, 97.9% of Chinese, 95.5% of Indians and 99.7% of Malays passed their Mother Tongue exams (Ministry of Education, 2002a). Most of these students were already studying Mother Tongue at a ‘second-language’ level (Ministry of Education, 2000c; Pakir, 1993), meaning standards are not as high as they are for the English exam. At O-levels, there was more differentiation in the pass rates by ethnic group (see Figure 4), with Malays performing the best with a 99.5% pass rate, while 96.1% of Chinese and 93.5% of Indians passed their Mother Tongue O-level exam in 2001.

A 1998 study comparing the acquisition of Japanese kanji (borrowed Chinese characters, but pronounced differently) by monolingual Chinese students from Beijing and bilingual Chinese university students from Singapore found that Singaporean students’ knowledge of stroke order for Chinese characters was significantly lower than both the mainland Chinese students and Japanese students (Okita & Guo, 2001). Learning correct stroke order forms an important base for successful character learning (Law et al., 1998; as cited in Okita & Guo, 2001). Okita and Guo also found that these elite students reported (on a 5-point Likert scale) writing Chinese ($M = 2.59$), particularly class notes ($M = 1.98$), much less frequently than they reported speaking either Mandarin ($M = 3.82$) or English ($M = 3.10$). The authors attributed Singaporeans’ poorer ability in writing Chinese characters to less exposure to Chinese characters in everyday life in Singapore.

One study looks at the degree of biliteracy in English and Chinese among Secondary 3 (~15-year-old) pupils in the Special stream (Cheng, 1997). These students scored in the top 10% on the PSLE and receive instruction in both English and Chinese at a ‘first-language’ level. They are expected to become highly biliterate. Cheng surveyed students’ language use and asked them to write both a persuasive and a narrative essay in each language. At home, 60.8% of the students report using Mandarin Chinese, 20.8% use English and 19% Chinese dialects. With friends, 86% report using Mandarin Chinese, while 30% report using English. Fifty-seven percent prefer watching TV shows in Mandarin, 40% like TV shows in both languages and 15% prefer TV shows in English. However, 69.2% preferred to read for pleasure in English, 24.2%
enjoyed reading in both languages and 6.7% preferred to read in Chinese. These findings indicate a greater oral/aural use of Mandarin but a greater literate use of English among these elite students. The students’ essays were graded for content, organisation, syntactic maturity, language use and mechanics; mean scores for students indicated only small differences in type of writing within each language; however, students performed significantly better on the English essays than the Chinese essays. Although the students certainly were considered biliterate, English was their stronger written language.

Two other studies hint at the degree of biliteracy that Singaporean students achieve. In a study on writing strategies of Chinese Singaporean students writing in English and Chinese, Wong (1993) took a sample of 43 Secondary 3 (ninth grade) students from four different schools and used a think-aloud protocol to measure their meaning-constructing strategies when writing in English and Chinese. Based on previous writing samples in Chinese and English, she separated them into four groups for analysis: (a) strong in English and Chinese (E+C+); (b) strong in English, weak in Chinese (E+C-); (c) weak in English and Chinese (E-C-); and (d) weak in English, strong in Chinese (E-C+). Wong does not specify how many of her subjects fall into each category, nor possible causes of the differences, for example in home language, parents’ language of education and/or students’ current academic stream. As Wong’s study focuses on the similarities and differences in students’ writing strategies in English and Chinese, it provides only tangential data for examining students’ overall proficiency in Chinese and English. The existence of the third (E-C-) and fourth groups (E-C+), for example, indicates that not all Chinese Singaporeans are mastering English; the E-C+ category reveals a group of students who are not English-dominant. However, the study does point to English dominance for most Singaporean students. Wong found that all the students tended to codeswitch more during the think-aloud protocol when writing in Chinese, especially when using academic vocabulary to discuss their writing. These vocabulary items (e.g. ‘comma,’ ‘paragraph’) are likely items the students have heard only in English.

Hsui examined reading attitudes and habits among 163 student teachers at Singapore’s National Institute of Education and found that these 22-year-olds ‘overwhelmingly preferred reading in English’ (Hsui, 1996: 411) to reading in Mother Tongue. Fully 75% of the student teachers favoured reading in English, whereas only 3% said they preferred to read in Mother Tongue. The teachers-in-training reported themselves as more proficient in English, having more home encouragement in reading English than Mother Tongue, and as having access to more reading materials, in a wider variety of topics and genres, in English than in Mother Tongue.

Conclusion

Singapore’s bilingual education policy can be said to have succeeded in several ways. First, it succeeded in shifting home language use from Chinese dialects to Mandarin and, perhaps unintentionally, from vernaculars and official Mother Tongues to English. When this policy was implemented,
virtually no one spoke English or Mandarin as their home language and only a small elite reached high levels of English or Mandarin proficiency. However, through education and the government-sponsored Speak Mandarin campaign, the Singaporean population essentially taught itself English and Mandarin in a matter of 20–30 years. That such a rapid language shift could also be accompanied by academic success contradicts theories of the supremacy of L1 instruction. Parents of the current students learned English (and Mandarin if Chinese) well enough in school to be able to speak those languages to their children, and probably chose to do so from a belief that speaking the language(s) of school at home would help their children succeed in Singapore’s competitive school system and bring economic benefits in the form of higher-paying jobs. Of course, it is possible that Singaporean students would perform even better, in content areas, Mother Tongue and English, if students’ actual home languages were developed more fully through the educational system; however, their excellent performance without this condition indicates the possibility of educating a whole society to high levels through the medium of an L2. Singaporean students today may perform better than those in other countries studying a former colonial language due to the codevelopment of literacy in their L1 alongside the development of literacy and concepts through English.

Second, Singapore’s policy succeeded in educating bilingual students who perform as well as or surpass students in other predominantly monolingual industrialised countries who are schooled monolingually. This achievement seems especially remarkable considering the starting point of English as a non-native language for the majority of Singaporeans when the policy was initially implemented. Although a much greater percentage of students now report English as their predominant home language, a majority still report Mandarin, Malay, Tamil or other languages as their predominant home language, and available evidence indicates that Mandarin and Malay remain, respectively, Chinese and Malay students’ predominant oral/aural language. Considering the importance of a strong foundation in oral language as a basis for developing literacy skills in a language (Snow et al., 1998), Singapore’s success in producing students who are academically successful in an orally non-dominant language is impressive.

How does the case of Singapore fit into the interdependence hypothesis? The interdependence hypothesis recommends development of academic concepts and skills in both languages for optimal bilingual development (Cummins, 2000). Singapore only partially meets this condition. First, when the bilingual education policy began, most Chinese and many Indian children did not speak their official ‘Mother Tongue’ at home and were therefore provided no development of their home language. However, these students acquired the school language(s) well enough to shift to speaking one (or both) of them at home with their children. Current Singaporean children do develop literacy skills in their predominant home language (if Mandarin, Malay, Tamil, Hindi, Punjabi, Bengali, Urdu or Gujarati) alongside the development of English literacy, which may enhance their acquisition of English literacy and academic skills. However, because ‘Mother Tongue’ is only studied as a single subject, current Singaporean students do not have the opportunity to develop
content-area concepts and knowledge through their home language. Again, there is the tantalising possibility that Singaporean students would achieve even higher levels of academic outcomes if provided with the opportunity to develop academic concepts through their home languages.

Future research needs to address the sociolinguistic situation in Singapore, investigating actual language use within different contexts and especially among family members in the home. Additionally, actual levels of oral/aural proficiency and literacy in all students’ reported languages should be assessed. More accurate data on how often each language in a child’s repertoire is used and how proficient a child is in these languages may shed new light on children’s academic outcomes. Furthermore, research into the linguistic, cultural and socioeconomic factors that may contribute to the achievement gap between ethnic groups in Singapore would be instructive.

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Notes

1. This percentage was calculated from raw PSLE data from the Singapore Ministry of Education (Ministry of Education, 2002b).
2. These percentages were calculated from raw student enrolment data from the Singapore Ministry of Education (Ministry of Education, 2001b).
3. For content-area exams tested in English, such as science, math, literature, arts and business, and non-Tamil Indian languages, The University of Cambridge (UK) Local Examinations Syndicate set and graded the exams through 2001, based on the exams used in the UK educational system; however, Mother Tongue exams are set and graded by the Singapore Ministry of Education (Ministry of Education, 2000a). Students in over 150 countries take the internationally recognised Cambridge GCE exams (UCLES, 1997–2002).
4. These percentages were calculated from raw student enrolment data from the Singapore Ministry of Education (Ministry of Education, 2001b).
5. These means were calculated by combining means of 2nd-year and 3rd-year Singaporean students in the cited study. Standard deviations were not provided.

References

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