Research Paper

ROE

The Relationship Between Orthographic Awareness and Chinese Reading in Hong Kong's Young CSL Learners

Yu Ka Wong

The Chinese University of Hong Kong

Abstract

Purpose: This study investigates young Chinese as a second language (CSL) learners' Chinese character reading performance and its relationship with their orthographic awareness. There is a pressing need to gain a better understanding of Hong Kong's ethnic minority students' CSL acquisition, so that more effective instruction can be provided.

Design/Approach/Methods: A total of 157 Hong Kong ethnic minority CSL students in Grade 4 were evaluated using a range of assessments: orthographic awareness in identifying and utilizing character components, listening comprehension for vocabulary terms and short texts, and reading Chinese character lists with single- and two-character words.

Findings: The students performed consistently across the two lists but made fewer errors when reading the two-character word list, most of which were orthographical. Multiple regression analysis showed that the students' orthographic awareness contributed significantly to their character reading.

Originality/Value: The findings suggest that orthographic awareness can help ethnic minority CSL learners improve their Chinese character reading skills. Chinese classes

Corresponding author:

Yu Ka Wong, Department of Curriculum and Instruction, The Chinese University of Hong Kong, Shatin, Hong Kong SAR, China.

Email: yukawong@cuhk.edu.hk

provided for such students, and for CSL learners in general, should place greater focus on literacy training.

Acquisition of literacy skills is one of the primary tasks of early schooling. As children begin primary education, they are normally fluent in their native oral language but possess only a limited understanding of its representation in writing. Learning to read lays the foundation for the life-long development of written language skills, which are crucial for success in both school and life. Unsurprisingly, many studies have focused on the improvement of early literacy instruction. Nonetheless, there remains a pressing need for a deeper understanding of the literacy acquisition process in the field of second language learning. First, the methods of acquisition and attainment levels of second language learners show greater variance than those of native learners (Aarts & Verhoeven, 1999). Second, the quality of literacy instruction influences the social integration and advancement of immigrant learners studying a dominant second language (August & Shanahan, 2008), such as ethnic minority children learning Chinese as a second language (CSL) in Hong Kong. These CSL learners have linguistic profiles and learning needs that differ greatly from their native Chinese-speaking counterparts. The perceived lack of proficiency in written and spoken Chinese among ethnic minorities has become a source of social concern (Wong & Shiu, 2009). Limitations in Chinese language skills can detrimentally affect the ability of ethnic minority students to excel in other fields of study and to integrate successfully into Hong Kong society (Loh & Tam, 2016). At both the primary and secondary school levels, these students tend to either perform poorly in literacy tasks or have a low opinion of their own reading and writing skills (Ku et al., 2005; Loper, 2004; Wong & Shiu, 2009). While the Hong Kong SAR government has implemented various measures to support the students' Chinese learning, researchers have called for deepening our understanding of Chinese literacy development in CSL students with the aim of providing better instruction (Li & Chuk, 2015; Wong, 2018c). CSL research to date has largely focused on Chinese character learning in adults (Shen, 2013), with comparatively few studies investigating young learners in Chinese-speaking societies. Additionally, the role of orthographic awareness on the literacy development of young CSL learners remains unclear (Wong, 2017b; Zhou & McBride, 2015). This study aims to fill

this gap by exploring the role of orthographic awareness in the acquisition of Chinese character reading skills by primary school students from Hong Kong's ethnic minority communities.

Chinese language learning by Hong Kong's ethnic minority students

Ethnic minority students constitute approximately 2.5% of the population of primary and second-ary schools in Hong Kong. Their families are predominately from South Asian countries such as India, Nepal, and Pakistan (Hong Kong Education Bureau, 2014). The students typically learn both Chinese and English as second languages in school, while speaking their native languages at home. Their multilingual context has important implications for their CSL development. As CSL learners, their Chinese language proficiencies, especially in reading and writing, are generally far lower than their native Chinese-speaking counterparts (Ku et al., 2005; Wong & Shiu, 2009). Their teachers are typically mainstream Chinese language teachers who lack any formal CSL training. For such teachers, adapting classroom instruction to suit the unique learning needs of their ethnic minority students often represents a major challenge (Gao, 2012). In fact, earlier studies linked the low levels of Chinese proficiency among ethnic minority students to the poor quality of Chinese language instruction they receive. Students who participated in Loper's (2004) study felt that their Chinese classes were unstructured and ineffective. In Ku et al.'s (2005) study, many students pointed out that their Chinese language education was inadequate and that the instruction was disorganized. Later studies found that teachers were not provided with proper training to adapt their teaching to the needs of ethnic minority students: The teachers were not familiar with the learning needs of students from different linguistic backgrounds (Shum & Gao, 2010; Tsung & Gao, 2012) or with corresponding instructional techniques (Tsung et al., 2010). A survey found that a majority of these teachers encountered difficulties in teaching Chinese to ethnic minority students (Hong Kong Unison & Hong Kong Professional Teachers' Union, 2007). In short, neither schools nor teachers have been adequately prepared to provide CSL instruction that addresses the learning needs of ethnic minority students.

CSL and the Chinese writing system

The problems faced by ethnic minority students in Hong Kong learning to read and write Chinese are shared by CSL learners worldwide. China's growing global influence has been matched by a growth of interest outside China in learning Chinese. Chinese, however, has long been considered a difficult foreign language, primarily due to its complex writing system (Everson, 2002). Differ-ing from alphabetic languages, Chinese is morpho-syllabic, with Chinese characters as its basic units. As a two-dimensional and visual–spatial unit, each character typically represents a syllable and serves as a morpheme representing various meanings (Cheung et al., 2006). A majority of Chinese characters can function as words; however, in modern usage, words are typically made up

of two or more characters (Perfetti & Tan, 1999). The number of Chinese characters currently in use is around 7,000, about half of which are frequently used in everyday life (Su, 2001; Zhang et al., 2000). Beyond the learning difficulties presented by the sheer quantity of characters needed to read Chinese is the complexity of Chinese orthography.

Chinese orthography has structural properties that can be categorized as graphical and functional (Li, 2007). The language's graphical properties are visual–structural components, that is, radicals and their spatial relationships, while its functional properties are the manners in which these radicals signify pronunciation and meaning. According to Su (2001), the majority of the 7,000 characters currently in use are compound characters (96%) that have more than one radical. Furthermore, around 80%–90% of these compound characters are ideo-phonetic compounds (Cheung et al., 2006; Kang, 1993; Li & Kang, 1993) composed of a semantic radical that relates to the character's meaning and a phonetic radical that suggests its pronunciation. For example, the compound character 河 (river, / hé /, /ho4/)[1] has a left–right structure and consists of two components: 氵 , which is a variant of 水 ("water," /shuǐ/, /seoi2/), and 可 ("can," / kě /, /ho2/). The left component 氵 is a semantic radical that indicates the related meaning of the character (i.e., "water"— to — "clear") and the right component 可 is a phonological radical that cues the sound (i.e., / kě / to / hé / or /ho2/ to /ho4/).

The complex nature of the Chinese writing system presents a major challenge to CSL learners (Everson, 2002; Liu, 2002). Promoting orthographic awareness by enhancing students' knowledge of the elements of the Chinese writing system may be instrumental in the acquisition of literacy skills by young CSL learners.

Orthographic awareness and Chinese literacy acquisition

Orthographic awareness in Chinese refers to the understanding of orthographic conventions and rules for Chinese characters (Qian et al., 2015; Wei et al., 2014) and has been found to play various roles in the literacy development of CSL and native Chinese-speaking learners. Numerous studies have shown that sub-character radical processing is evident during Chinese character reading for both native Chinese speakers (Pine et al., 2003) and CSL learners (Shen, 2005; Shen & Ke, 2007; Tong & Yip, 2015; Williams, 2013; Wong, 2017b). Chinese orthographic knowledge and skills are correlated with Chinese character reading proficiency (Cheung et al., 2006; Yeung et al., 2011; Yeung et al., 2013) and reading comprehension (Ho et al., 2003; Zhang et al., 2014). Similarly, Zhou and McBride (2015), Zhou et al. (2018), and Wang et al. (2018) identified orthographic skills among a range of abilities related to the word-level reading skills of young CSL learners (though the researchers found that orthographic skills were of lesser importance than Chinese phonological awareness skills). Furthermore, studies concerning the CSL development of Hong Kong's ethnic minority students have found that orthographic processing facilitates text comprehension (Leong

et al., 2011; Shum et al., 2014). In a longitudinal study, Wong (2017b, 2019) identified the crucial role orthographic knowledge plays in the development of reading comprehension skills among young CSL learners. The relative influence of orthographic awareness, as compared to that of oral language (as indicated by phonological awareness in Zhou and associates' studies), on young CSL learners' literacy development has not yet been confirmed.

In summary, the current body of research suggests that orthographic skills are influential in Chinese learners' literacy development. There remains, however, a need to scrutinize the relationship between CSL learners' character reading performance and their levels of Chinese orthographic awareness (particularly when controlling for oral competence). To this end, the present study investigated the relationship between Chinese character reading skills and orthographic awareness in ethnic minority students in Hong Kong.

Method

Participants

The participants of the study were 157 Hong Kong ethnic minority students in Grade 4. Each of the students had received at least 2 years of formal Chinese literacy instruction. The participants were drawn from six government-subsidized schools with substantial ethnic minority student populations. A majority of the students came from families of low to moderate socioeconomic status. In response to the students' limited Chinese competence and their learning needs as CSL learners, all six schools had developed a school-based Chinese curriculum and adapted simpler learning materials. The spoken language of instruction at each school was Cantonese. Native Chinese-speaking students and ethnic minority students who had lived in Hong Kong for less than 3 years were excluded from the study.

Among the 157 students, 76 were male and 81 were female. At the time of data collection, the students averaged 10.29 (SD = 0.75) years of age, 9.10 years (SD = 2.35) of residence in Hong Kong, and 3.62 years (SD = 0.88) of study at their respective primary schools. The majority of the students were South Asians whose families had come from India (14 students, 8.92%), Pakistan (74 students, 47.13%), or Nepal (51 students, 32.48%). Ten students (6.37%) had families from the Philippines and two students (1.27%) had families from Thailand. Only six students (3.82%) were of other ethnicities. A total of 120 students (76.43%) were born in Hong Kong and 117 (74.52%) had received pre-primary education in Hong Kong.

Measures

Chinese character reading. A Chinese character recognition test was developed for this study and contained test items composed of Chinese characters presented either as single characters or as two-character words. Chinese characters at the local Grade 1 level were selected with reference to

Pan and Kang's study (2003) on the use of Chinese characters in Hong Kong primary schools, which listed 3,000 frequently used characters, categorizing them into six levels from Grades 1 to 6. Fifty characters were selected from the Grade 1 list as single-character items and another 25 as leading characters for the word items. The word items were then chosen (by combining a leading character with another character) with reference to a list of elementary Chinese words prepared for Hong Kong's primary school students (The Chinese Language Education Section of the Hong Kong Education Bureau, 2008). All chosen words came from the word list at the junior-primary level. There were a total of 100 items with 50 single characters, for example, 每 ("every," / měi /, /mui5/) and 南 ("south," / nán /, /naam4/), and 25 two-character words, for example, 說話 consisting of 說 ("to speak," / shuō /, /syut3/) and 話 ("speech," / huà /, /waa6/) and 十分 consisting of 十 ("ten," / shí /, /sap6/) and 分 ("cent," / fēn /, /fan1/). The test was designed as an individual test, with each student required to dictate the characters one by one following the instructions of a test administrator. Each correct pronunciation was awarded one point.

The characters that the students successfully read aloud were scored and the errors they made (i.e., those they misread as other characters) were recorded. After the test, the students' errors were categorized into two types: orthographical or morphological. Orthographical mistakes refer to cases in which students misread a character due to the similarity of its form with other characters or its sharing of the same component with other characters, such as 每 misread as 母 ("mother," / mǔ /, /mou5/) and 話 in 說話 misread as 活 ("alive," / huó /, /wut6/). Morphological mistakes refer to cases in which students misread a character due to the similarity of its meaning with that of other characters or some shared word-compounding effects: For example, 南 misread as 北 ("north," / běi /, /bak1/) as both characters refer to directions and 分 in 十分 (the two-character word means "10 cents") misread as 元 ("dollar," / yuán /, /jyun4/; the two-character word 十元 means "10 dollars").

Chinese orthographic awareness. A test was developed to assess the students' Chinese orthographic knowledge. The test evaluated their visual-orthographic sensitivity, their knowledge of the semantic and phonological radicals' representational functions, and their competence in applying this knowledge. The items were designed with reference to similar tests assessing Chinese orthographic knowledge used by Ho et al. (2003), Jackson et al. (2003), Li et al. (2012), and Shen and Ke (2007). Efforts were made to ensure that all test items were new to the participants: The characters were from the Grade 6 level according to Pan and Kang's study (2003) and their respective teachers confirmed that the characters had not been covered in their Chinese lessons.

The test consisted of three parts. Part (a) was a graphical perception test requiring the students to split a compound character into two immediate componential radicals. All three common configurations of Chinese characters, that is, left–right, top–down, and half-/all-rounded, were

**Table 1.** Sample items for the Chinese orthographic awareness test.

(1)   Sample item for Part (a) requiring students to separate the compound characters into two parts.

彰 ⟶ 章 彡
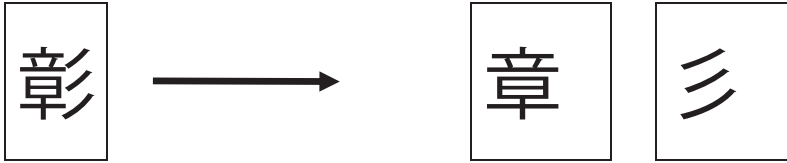
(2)   Sample item for Part (b) requiring students to choose a Chinese character that corresponds to the picture with English explanations.

sad[a]   萋 悽 嘜

          A   B*   C
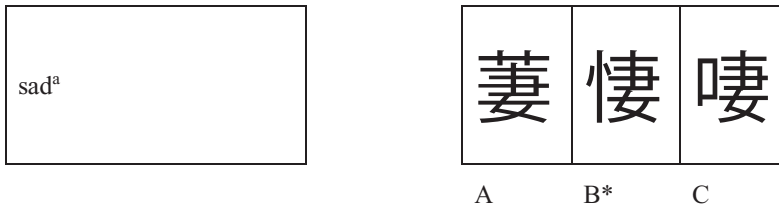
(3)   Sample item for Part (c) requiring students to identify the pronunciations of the specified characters from among three recorded sounds. In this sample, the sound of 舺 in Cantonese is /gaap3/, and the three options are (A) 甲 /gaap3/, (B) 舟 /zau1/, and (C) 船 /syun4/.

Example,   舺   A*   B   C
例
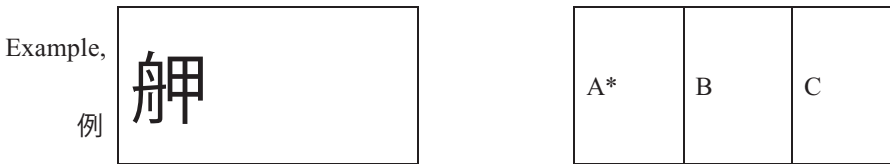
Note. Correct answers are marked by an asterisk.
[a]The picture has been removed to avoid potential violations of third-party copyright.

represented. Part (b) assessed the participants' semantic radical knowledge by requiring them to use the information provided by the semantic radical to guess the meaning of novel characters. The participants were required to choose the character that best matched a picture (provided with an English explanation) among three novel characters. Similarly, Part (c) assessed the participants' abilities to use the information provided by a phonetic radical to phonologically decode a novel character. The task required the participants to choose the sound recording that best matched the pronunciation of the novel character among three recordings. To help familiarize students with the test item formats, an example item and two trial items were prepared for each part of the test. Sample items for each part of the test are presented in Table 1.

Chinese listening comprehension. The listening comprehension test consisted of six selections from different genres (such as story or dialogue) to assess the participants' Chinese oral competence.

Table 2. Alpha values and descriptive statistics for the variables used in the study.

Variable		Maximum score	Mean (%)	SD
Character reading (single)	.96	50	22.94 (46)	12.87
Character reading (word)	.97	50	25.57 (51)	13.40
Character reading (combined)	.98	100	48.51 (49)	26.01
Orthographic awareness	.80	30	21.06 (70)	4.73
Listening comprehension	.69	20	8.39 (42)	3.53

Note. N = 157. "Single" refers to the list of characters presented as a single character; "Word" refers to the list of characters presented in two-character words; "Combined" refers to combinations of the single-character and word lists.

Participants were required to answer multiple-choice questions on the main points of the content. The instructions and test items were read aloud to the students. There were a total of 20 items.

Analysis

The data collected were first screened and assessed for the respective scales' distributional properties and their correlations. Then, the participants' Chinese character reading results were analyzed by evaluating and comparing their average scores and errors made in the single-character and two-character word lists. Finally, regression on character reading was conducted with both Chinese orthographic awareness and listening comprehension as predictors. The latter was used to control the effects of Chinese oral competence.

Results

Descriptive statistics and correlations

Referring to Table 2, all measures were of good reliability, with Cronbach's α close to or well above .70. The students performed fairly in character reading with an average slightly below 50% for the single-character word list and an average slightly above 50% for the two-character word list. The students performed better in the orthographic awareness test, with an average of 70%, showing that they had developed a good sense of Chinese orthography and could make use of the linguistic information of a character's constituent components. As presented in Table 3, all variables were correlated with statistical significance ($p < .01$).

Performance and error analysis of character reading

As stated above, the students' performance on the two-character lists was fair, comparable, and correlated significantly at $r = .96$, $p < .000$. However, the students performed better in the two-character list with a margin of 2.63 on average, which, as shown by a t-test, was statistically significant: $t(156) = 8.79$, $p < .000$. By analyzing the students' misreading errors (i.e., the students

Table 3. Correlations among the variables used in the study.

Variables	1	2	3	4
1. Character reading (single)	—			
2. Character reading (word)	.96*	—		
3. Character reading (combined)	.99*	.99*	—	
4. Orthographic awareness	.72*	.73*	.73*	—
5. Listening comprehension	.62*	.59*	.61*	.51*

Note. N = 157. "Single" refers to the list of characters presented as a single character; "Word" refers to the list of characters presented in two-character words; "Combined" refers to combinations of the single-character and word lists. *p < .01.

Table 4. Error analyses of Chinese character reading.

Condition	Total	Error type		
		Orthographical	Morphological	Unclassified
Single	603	399 (66.17%)	99 (16.42%)	105 (17.41%)
Word	324	159 (49.07%)	105 (32.41%)	60 (18.52%)
Combined	927	558 (60.19%)	204 (22.01%)	165 (17.08%)

Note. "Single" refers to the list of characters presented as a single character; "Word" refers to the list of characters presented in two-character words; "Combined" refers to combinations of the single-character and word lists.

did not say they do not know the characters but misread them as other characters), it was also found that they made noticeably more errors in reading the single-character list than the two-character list (603 vs. 324 out of a total of 927 errors). The errors they made were then further scrutinized. As stated above, the errors were categorized as either orthographical or morphological, and those that could not be categorized were labeled as unclassified. As reported in Table 4, a similar proportion of unclassified errors (around 18%) was observed across the lists. The majority of errors were orthographical (60.19%) rather than morphological (22.01%); however, a substantial rise in the proportion of morphological errors (32.41%) was present when the students read two-character words. These findings suggest the priming effect for meaning in Chinese word reading and the CSL readers' sensitivity to both the orthographic and morphological information contained in the Chinese characters.

Regression analysis

Regression analysis was conducted with listening comprehension and orthographic awareness as independent variables to identify the variance of character reading. The results are reported in

Table 5. Regression explaining character reading from orthographic awareness and listening comprehension.

Variables	Reading comprehension			
	R^2	β	sr^2 (%)	t
	.61**			
Listening comprehension		.32	7.84	5.44**
Orthographic awareness		.57	24.01	9.62**

**p < .001.

Table 5. Listening comprehension was used as a control for the influence of the students' Chinese oral language competence including vocabulary and general comprehension. The model accounted for a significant portion (61%) of character reading variance. Controlling for oral competence, the students' Chinese orthographic awareness still had a relatively strong influence on character reading (β = .57), which independently accounted for 24.01% of its variance. The results supported the importance of orthographic awareness for character reading.

Discussion

This study aimed to investigate the relationship between CSL character reading and orthographic awareness in Hong Kong's ethnic minority primary school students. Error analysis of the students' character reading showed that they were sensitive to the linguistic information contained in Chinese characters. Results of multiple regression further suggested that orthographic awareness had a major contribution to their character reading over and beyond the influence of oral language competence. These findings have educational implications in pedagogy facilitating students' CSL learning.

First, the study's findings rendered unequivocal support to the importance of orthographic awareness in young CSL learners' Chinese literacy acquisition. The students' Chinese orthographic awareness, including their visual-orthographic sensitivity in Chinese and their knowledge of semantic and phonological radicals, was an important predictor of their character reading controlling for their oral language competence. Comparatively, the contribution of orthographic awareness was more dominant: It had a β-value of .57 and explained independently 24.01% of variance in character reading, while oral language had a β-value of .32 and explained independently 7.84%. Furthermore, the majority of the errors students made in character reading were orthographical (about 60%), showing that they were sensitive to the characters' orthographic forms and their constituent components (i.e., radicals). With reference to previous studies on young CSL learners' literacy development (Wong, 2017b; Zhou & McBride, 2015), whereas the influence of

orthographic awareness/skill on character reading had remained unclear, this study supports the importance of students' orthographic awareness in Chinese character and word reading.

These results are largely aligned with previous research concerning CSL learners' Chinese literacy acquisition and indicate that orthographic skills are a major constraint on such learners' literacy development. Like most CSL learners, Hong Kong's ethnic minority students who participated in this study recognized the componential radicals when reading characters (Shen & Ke, 2007; Williams, 2013; Wong, 2017b), and their orthographic skills played a crucial role in their Chinese word reading (Zhou & McBride, 2015; Zhou et al., 2018). Previous studies indicate that the orthographic skills of young CSL learners aid their further literacy development in reading comprehension (Leong et al., 2011; Shum et al., 2014; Wong, 2017a) and writing (Leong et al., 2018; Wong, 2018a).

The findings of this study emphasize the importance of helping CSL learners develop a solid knowledge base in Chinese orthography. To address the needs of CSL students, Chinese language teachers should be equipped with related instructional knowledge and skills to enhance the effectiveness of their CSL lessons. This conclusion aligns with the findings of previous studies on Hong Kong's Chinese language education provided for ethnic minority students (e.g., Tsung et al., 2010).

The findings also suggest that morphological awareness played a role in the students' Chinese character reading. The participants performed better when the characters they read were presented in a word context and showed a heightened sensitivity to morphological information (as evidenced by making a substantial portion of morphological errors, about 22%). Morphological skills refer to the learners' awareness of and ability to manipulate morphemes, the smallest units of meaning, which, in Chinese, refer largely to Chinese characters and semantic radicals of the dominant ideo-phonetic compounds (McBride & Wang, 2015). As with native Chinese-speaking children, the ability to manipulate compound morphology and detect homophones/homographs with different meanings predicts vocabulary knowledge (McBride-Chang et al., 2008) and character recognition (Li et al., 2012; Liu & McBride-Chang, 2014). In the case of CSL learners, Wong (2018b) found a strong reading-to-listening influence and attributed it to the promotion of morphological awareness by literacy acquisition. The role played by morphological awareness in the CSL learners' language and literacy development should be scrutinized in further studies.

Educational implications

The present findings suggest that orthographic awareness is important to CSL learners' literacy acquisition and development. These learners may benefit from a systematic approach to Chinese literacy instruction to help them develop a solid knowledge base of Chinese orthography. The literacy instructional approach may underscore how characters serve as the foundational linguistic unit of Chinese and may be used to facilitate literacy development. With reference to

prevalent CSL learning materials and previous studies, similar instructional strategies were found to evince positive results in developing foreign students' literacy regardless of whether they learned CSL in a foreign-language classroom with limited instructional time (Lü et al., 2015; Wang et al., 2003) or in an immersion environment in which Chinese was the primary language of instruction (Tse et al., 2012; Wang, 2009). The approach emphasizes the morphological analysis of words (i.e., the ways in which characters combine to form words; Jian, 2012; Wong, 2018c), the shape-to-meaning connections in simple characters (Hu, 2008; Wong, 2017b), and knowledge of semantic and phonological radicals as constituents of compound characters (Hu, 2008; Shen, 2013; Wong, 2017b).

Ethnic minority students in Hong Kong require strong Chinese language competence for academic advancement and social integration. There is an urgent need to introduce an effective Chinese language curriculum that addresses their unique learning needs. The present study found that higher levels of orthographic awareness correspond to improved literacy performance and development. These findings support the incorporation of a more orthographically focused instructional approach into Hong Kong's CSL curriculum. Additionally, CSL teachers must be provided with the training they need to deliver the benefits of this approach to their students.

Declaration of conflicting interests

Funding

Note

1. The English meaning, Putonghua pinyin, and Romanized Cantonese pronunciation of each Chinese character (in the traditional form) that is newly introduced in the text are provided in brackets.

References

Aarts, R., & Verhoeven, L. (1999). Literacy attainment in a second language submersion context. *Applied Psycholinguistics*, *20*, 377–393.

August, D., & Shanahan, T. (2008). *Developing reading and writing in second-language learners: Lessons from the report of the national literacy panel on language-minority children and youth*. Routledge.

Cheung, H., McBride-Chang, C., & Chow, B. W.-Y. (2006). Reading Chinese. In R. M. Joshi & P. G. Aaron (Eds.), *Handbook of orthography and literacy* (pp. 421–438). Lawrence Erlbaum.

Chinese Language Education Section of the Hong Kong Education Bureau. (2008). *Lexical items with English translations for fundamental Chinese learning in Hong Kong schools*. Education Bureau of Hong Kong SAR.

Everson, M. E. (2002). Theoretical developments in reading Chinese and Japanese as foreign languages. In J. H. Sullivan (Ed.), *Literacy and the second language learner* (pp. 1–16). Information Age Publishing.

Gao, F. (2012). Teacher identity, teaching vision, and Chinese language education for South Asian students in Hong Kong. *Teachers and Teaching: Theory and Practice*, *18*(1), 89–99.

Ho, C. S.-H., Ng, T.-T., & Ng, W.-K. (2003). A 'radical' approach to reading development in Chinese: The role of semantic radicals and phonetic radicals. *Journal of Literacy Research*, *35*(3), 849–878.

Hong Kong Education Bureau. (2014). *Replies to supplementary questions raised by finance committee members in examining the estimates of expenditure 2014–15*. http://www.legco.gov.hk/yr14-15/english/fc/fc/sup_w/s-edb-e.pdf

Hong Kong Unison & Hong Kong Professional Teachers' Union. (2007). *A survey of frontline teachers on "ethnic minority students learning Chinese"* [in Chinese]. Hong Kong Unison.

Hu, W. (2008). *Chinese characters and Chinese character instruction in teaching Chinese as a foreign language* [in Chinese]. Xuelin Press.

Jackson, N. E., Everson, M. E., & Ke, C. (2003). Beginning readers' awareness of the orthographic structure of semantic-phonetic compounds: Lessons from a study of learners of Chinese as a foreign language. In C. McBride-Chang & H.-C. Chen (Eds.), *Reading development in Chinese children* (pp. 141–153). Praeger.

Jian, C. (2012). The relation between the "character-based" theory and TCSL [in Chinese]. *Taitung University College of Humanities*, *2*(1), 251–275.

Kang, J. (1993). Analysis of semantics of semantic-phonetics compound characters in modern Chinese [in Chinese]. In Y. Chen (Ed.), *Information analysis of usage of characters in modern Chinese* (pp. 71–83). Shanghai Education Publishing House.

Ku, H.-B., Chan, K.-W., & Sandhu, K. K. (2005). *A research report on the education of South Asian ethnic minority groups in Hong Kong*. Centre for Social Policy Studies, Department of Applied Social Sciences, The Hong Kong Polytechnic University.

Leong, C. K., Shum, M. S. K., Tai, C. P., Ki, W. W., & Zhang, D. (2018). Differential contribution of psycholinguistic and cognitive skills to written composition in Chinese as a second language. *Reading and Writing*. Advance online publication.

Leong, C. K., Tse, S. K., Loh, K. Y., & Ki, W. W. (2011). Orthographic knowledge important in comprehending elementary Chinese text by users of alphasyllabaries. *Reading Psychology*, *32*(3), 237–271.

Li, D. (2007). Systematization and recognition of Chinese characters [in Chinese]. In A. Gu, X. Jiang, & Y. Wan (Eds.), *The cognition, learning and teaching of Chinese characters* (pp.107–120). Beijing Language and Culture University Press.

Li, D. C. S., & Chuk, J. Y. P. (2015). South Asian students' needs for Cantonese and written Chinese in Hong Kong: A linguistic study. *International Journal of Multilingualism*, *12*(2), 210–224.

Li, H., Shu, H., McBride-Chang, C., Liu, H., & Peng, H. (2012). Chinese children's character recognition: Visuo-orthographic, phonological processing and morphological skills. *Journal of Research in Reading*, *35*(3), 287–307.

Li, Y., & Kang, J. (1993). Analysis of phonetics of semantic-phonetics compound characters in modern Chinese [in Chinese]. In Y. Chen (Ed.), *Information analysis of usage of characters in modern Chinese* (pp. 84–98). Shanghai Education Publishing House.

Liu, D., & McBride-Chang, C. (2014). Morphological structure processing during word recognition and its relationship to character reading among third-grade Chinese children. *Journal of Psycholinguistic Research*, *43*(6), 715–735.

Liu, X. (2002). *Teaching of Chinese as a second language: A brief introduction* [in Chinese]. Beijing Language and Culture University Press.

Loh, E. K. Y., & Tam, L. C. W. (2016). Struggling to thrive: The impact of Chinese language assessments on social mobility of Hong Kong ethnic minority youth. *Asia-Pacific Education Researcher*, *25*(5–6), 763–770.

Loper, K. (2004). *Race and equality: A study of ethnic minorities in Hong Kong's education system*. Centre for Comparative and Public Law, Faculty of Law, the University of Hong Kong.

Lü, C., Koda, K., Zhang, D., & Zhang, Y. (2015). Effects of semantic radical properties on character meaning extraction and inference among learners of Chinese as a foreign language. *Writing System Research*, *7*(2), 169–185.

McBride, C., & Wang, Y. (2015). Learning to read Chinese: Universal and unique cognitive cores. *Child Development Perspectives*, *9*(3), 196–200.

McBride-Chang, C., Tardif, T., Cho, J.-R., Shu, H., Fletcher, P., Stokes, S. F., Wong, A., & Leung, K. (2008). What's in a word? Morphological awareness and vocabulary knowledge in three languages. *Applied Psycholinguistics*, *29*(3), 437–462.

Pan, H., & Kang, B. (2003). *A study of the Chinese characters recommended for the subject of Chinese language in primary school* [in Chinese]. The Hong Kong Baptist University Language Centre.

Perfetti, C. A., & Tan, L. (1999). The constituency model of Chinese character identification. In J. Wang, A. Inhoff, & H.-C. Chen (Eds.), *Reading Chinese script: A cognitive analysis* (pp. 115–134). Lawrence Erlbaum.

Pine, N., Huang, P.'a., & Huang, R. S. (2003). Decoding strategies used by Chinese primary school children. *Journal of Literacy Research*, *35*(2), 777–812.

Qian, Y., Song, Y.-W., Zhao, J., & Bi, H.-Y. (2015). The developmental trend of orthographic awareness in Chinese preschoolers. *Reading and Writing: An Interdisciplinary Journal*, *28*(4), 571–586.

Shen, H. H. (2005). An investigation of Chinese-character learning strategies among non-native speakers of Chinese. *System*, *33*, 49–68.

Shen, H. H. (2013). Chinese L2 literacy development: Cognitive characteristics, learning strategies, and pedagogical interventions. *Language & Linguistics Compass*, *7*, 371–387.

Shen, H. H., & Ke, C. R. (2007). Radical awareness and word acquisition among nonnative learners of Chinese. *The Modern Language Journal*, *91*(i), 90–111.

Shum, M. S. K., & Gao, F. (2010). Investigating the role of bilingual teaching assistants in Hong Kong: An exploratory study. *Educational Research*, *52*(4), 445–456.

Shum, M. S. K., Ki, W. W., & Leong, C. K. (2014). Cognitive and linguistic factors affecting alphasyllabary language users comprehending Chinese text. *Reading in a Foreign Language*, *26*(1), 153–175.

Su, P. (2001). *Modern Chinese orthography* (revised ed.) [in Chinese]. Peking University Press.

Tong, X., & Yip, J. H. Y. (2015). Cracking the Chinese character: Radical sensitivity in learners of Chinese as a foreign language and its relationship to Chinese word reading. *Reading and Writing: An Interdisciplinary Journal*, *28*, 159–181.

Tse, S. K., Ki, W. W., & Shum, M. S. K. (Eds.). (2012). *Chinese language learning and teaching for non-Chinese speaking students: Curriculum, instructional materials, instructional practices and assessment* [in Chinese]. The Hong Kong University Press.

Tsung, L., & Gao, F. (2012). What accounts for the underachievement of South Asians in Hong Kong? The voices of Pakistani and Nepalese parents. *Educational Research*, *54*(1), 51–63.

Tsung, L., Zhang, Q. Y., & Cruickshank, K. (2010). Access to majority language and educational outcomes: South Asian background students in postcolonial Hong Kong. *Diaspora, Indigenous, and Minority Education*, *4*(1), 17–32.

Wang, J. (2009). *Character-based and teaching Chinese as a foreign language* [in Chinese]. Shanghai Jiao Tong University Press.

Wang, M., Perfetti, C. A., & Liu, Y. (2003). Alphabetic readers quickly acquire orthographic structure and function of a new writing system. *Scientific Studies of Reading*, *7*(2), 183–208.

Wang, Y., McBride, C., Zhou, Y., Joshi, R. M., & Farver, J. (2018). Becoming literate in Chinese: A comparison of native-speaking and non-native-speaking children. *Journal of Research in Reading*, *41*(3), 511–524.

Wei, T.-Q., Bi, H.-Y., Chen, B.-G., Liu, Y., Weng, X.-C., & Wydell, T. N. (2014). Developmental changes in the role of different metalinguistic awareness skills in Chinese reading acquisition from preschool to third grade. *PLoS One*, *9*(5), 1–11.

Williams, C. (2013). Emerging development of semantic and phonological routes to character decoding in Chinese as a foreign language learners. *Reading and Writing: An Interdisciplinary Journal*, *26*, 293–315.

Wong, Y. K. (2017a). Relationships between reading comprehension and its components in young Chinese-as-a-second-language learners. *Reading and Writing: An Interdisciplinary Journal*, *30*, 969–988.

Wong, Y. K. (2017b). The role of radical awareness in Chinese-as-a-second-language learners' Chinese character reading development. *Language Awareness*, *26*(3), 211–225.

Wong, Y. K. (2018a). Exploring the reading-writing relationship in young Chinese language learners' sentence writing. *Reading and Writing*, *31*, 945–964.

Wong, Y. K. (2018b). Developmental relations between listening and reading comprehension in young Chinese language learners. *Journal of Psycholinguistic Research*. Advance online publication.

Wong, Y. K. (2018c). Structural relationships between second-language future self-image and the reading achievement of young Chinese language learners in Hong Kong. *System*, *72*, 201–214.

Wong, Y. K. (2019). Role of decoding competence in the Chinese reading comprehension development of ethnic minority students in Hong Kong. *International Journal of Bilingual Education and Bilingualism*, *22*(8), 1016–1029.

Wong, Y. K., & Shiu, L. P. (2009). Chinese language attainment of ethnic minority primary school students [in Chinese]. *Journal of Basic Education*, *18*(2), 123–136.

Yeung, P.-S., Ho, C. S.-H., Chan, D. W.-O., Chung, K. K.-H., & Wong, Y.-K. (2013). A model of reading comprehension in Chinese elementary school children. *Learning and Individual Differences*, *25*, 55–66.

Yeung, P.-S., Ho, C. S.-H., Chik, P. P.-M., Lo, L.-Y., Luan, H., Chan, D. W.-O., & Chung, K. K.-H. (2011). Reading and spelling Chinese among beginning readers: What skills make a difference? *Scientific Studies of Reading*, *15*(4), 285–313.

Zhang, J., McBride-Chang, C., Wong, A. M.-Y., Tardif, T., Shu, H., & Zhang, Y. (2014). Longitudinal correlates of reading comprehension difficulties in Chinese children. *Reading and Writing: An Interdisciplinary Journal*, *27*, 481–501.

Zhang, T., Chen, L., & Li, W. (2000). *Contemporary Chinese character reading and writing* [in Chinese]. Sichuan Education Press.

Zhou, Y., & McBride, C. (2015). The same or different: An investigation of cognitive and metalinguistic correlates of Chinese word reading for native and non-native Chinese speaking children. *Bilingualism: Language and Cognition*, *21*(4), 765–781.

Zhou, Y., McBride, C., Leung, J. S. M., Wang, Y., Joshi, R. M., & Farver, J. (2018). Chinese and English reading-related skills in L1 and L2 Chinese-speaking children in Hong Kong. *Language, Cognition and Neuroscience*, *33*(3), 300–312.