Kanji Learning in a Mixed Class of Students from Character and Non-Character Based Language Backgrounds

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Abstract

This paper presents findings of a study which investigated how students' language background (i.e. character-based or non-character based L1) influenced the way they learned *kanji* in the same classroom (i.e. with the same instruction). The study was conducted in an intermediate level, *kanji*-focused course where a core group of the cohort were non-character based L1 background (NCB: English) learners. The study examines the NCB students' *kanji* learning in the course, in comparison to that by character based L1 (CB) learners in the same course, and explores the different performance of the CB and NCB learners. The findings indicated that the instruction in class assisted both the NCB and CB learners to improve their *kanji* learning. The different performance of each group suggested different paths to learning kanji. However, their test results showed a significant overlap in their *kanji*, thus suggesting some common progression of kanji learning.

1   Introduction

Kanji plays a core role in Japanese language systems. Japanese writing consists of *kanji* and *kana (hiragana and katakana)*. *Kanji* forms a large part of Japanese vocabulary (particularly content words, such as nouns, verbs, adverbs, etc.). Thus *kanji* knowledge and comprehension are essential for word recognition in Japanese, and thus, for comprehension of Japanese text. As learners of Japanese progress, *kanji* becomes increasingly important in their learning, in order to expand their vocabulary and comprehension of Japanese. For example, when the learners' vocabulary increases, they need to deal with many homonyms which can only be distinguished by the characters they contain and in the contexts they are used. That is, the increase of vocabulary usually means that the learners need to remember more *kanji*.

JFL courses often allocate a relatively small portion of the course hours directly to *kanji* learning. The courses normally offer content which promotes a balanced four skill development – dividing the course into components each of which focuses either on one skill or on some combination of the four skills (such as listening and speaking, reading and writing, listening and reading, reading and speaking, writing and speaking, etc.). In such classes, *kanji* learning tends to fall within areas such as script recognition, comprehension of text and writing.

Lecturers and tutors in Japanese language courses at tertiary level are sometimes concerned that CB learners might have too much advantage over NCB learners with *kanji* learning. Previous studies also indicate a potential advantage (e.g. L1 influences, L1 transfer, advantage of previous L1 knowledge, etc.). JFL learners believe that they can learn *kanji* by themselves (Shimosegawa,

1984; Shimizu, 1994; Toyoda 1995). However, there is little opportunity to observe in the classroom how much disadvantage the NCB learners suffer with *kanji* learning from lack of character learning in L1.

Therefore, understanding JFL learners' *kanji* learning, particularly the differences resulted from different L1 backgrounds, is essential to improve teaching in JFL classes of mixed CB and NCB learners. It is also vital to help the NCB learners by providing appropriate assistance to minimise the disadvantage.

2 Literature review

2.1 L1 influence to L2/FL learning

It is well acknowledged that L1 knowledge plays a role in L2/FL language acquisition. Previous studies have found that predicting the L1 influence on L2 learning was more complex than the Contrastive Analysis Hypothesis had claimed (i.e. predictable by systematic linguistic comparison of L1 and L2). Flynn (1983) found inter-group differences by re-examining the data of L2 learner groups where previously no L1 effect was found between the different L1 learner groups. Schachter (1983) suspects that L1 transfer may control the nature of hypotheses the learners make about L2/FL. Zobl (1982, 1983) found that L1 knowledge affected the pace at which a developmental sequence progresses in L2 and the number of developmental structures in such a sequence. Zobl identified three constraints on L2 learning: 1) *congruence of L1 form* (which slows down the pace of progress of a sequence); 2) *zero contrast*, i.e. learners' L1 lacks a category found in L2 (which delays or adds additional stages in the sequence); and 3) *marked L1 features* (unmarked L1 features can be transferred to L2 but not marked L1 features).

2.2 Word recognition and comprehension in L1 and L2

Word recognition includes awareness (e.g. Chikamatsu, 1996; Koda, Takahashi, & Fender, 1998; Shu & Anderson, 1998; Toyoda, 2009) and requires not only correct recognition, but also automatic processing (i.e. the quick fluent detection of word form, sound and meaning) (Koda, 2007).

The development of word recognition by learners appears to follow similar stages whether L1 is alphabetical or logographic (like Chinese, or *kanji*). Firstly, learners approach words directly and holistically, with very limited discriminatory mechanisms such as word length or overall word shape. Then once they have learned a certain number of words, they look for internal rules of word formation, phonologically and morphologically (orthographically) (Harris & Coltheart, 1986; Ho & Bryant 1997; Ho, Ng & Ng, 2003).

However, learners from different orthographies appear to develop different awareness of orthographic rules such as how phonemes and morphemes are combined to form word meaning and pronunciation. For example, CB (Chinese-speaking) children demonstrate more awareness of morphology of compounds than NCB (English-speaking) children. In contrast, NCB (English-speaking) children show more awareness of derivational morphology than CB (Chinese-speaking) children (Ku & Anderson, 2003). Koda (1990, 1995) found that her phonographic L1 learners were more aware of phonological changes than CB learners; Akamatsu's (1996) CB learners were more sensitive to orthographic changes (case differences).

Charlisle (1995) demonstrated that phonological awareness explained efficient word recognition in text, and morphological awareness best predicted children's reading comprehension in a longitudinal study. Phonemic awareness training also improved word reading skills (Ball & Blachman, 1991). However, Koda et al. (1998) argued that morphological awareness alone plays a critical role, separately from phonological awareness, in reading and writing development in English after reviewing previous studies (Feldman, Frost & Pnini, 1995; Taft, 1991; Tyler & Nagy, 1989).

Koda et al. (1998) presented a cross-linguistic analysis demonstrating that Chinese and English readers need to go through critically different morphological processes to understand words. English (concatenative) L1 readers need to engage very systematic, linear morphological composition and decomposition (e.g. real: un-real, real-ity, real-ize, real-istic) during their word processing, even though the systematicity varies considerably (e.g. -ty, -ness, -tion to form nouns). Chinese (non-concatenative) L1 readers go through a non-linear, ideographic character (e.g. 明: 日＋月, 棟: 木＋東) and semantic-phonetic (radical) composition (秋、空、雪) to form words (Taylor & Taylor, 1983). These intraword morphemes (characters and radicals) are useful but do not provide sufficient or systematic enough information to recognise words. Therefore, to recognise Chinese words requires both whole word level (whole characters) and intraword morphemes (ideographs and radicals).

2.3   Japanese vocabulary (content words)

Kanji characters were adopted from Chinese and many *kanji* characters have two readings: *on-* (Chinese reading) and *kun-* (Japanese) readings (Kaiho & Nomura, 1983). In *kun*-reading, for example, 外 [soto, hoka], denotes the meaning of *kanji* ([soto] meaning "outside" and [hoka] meaning "besides" or "other than"). Since Japanese and Chinese sound systems are not the same (with and without tones, and different phonemes), the on-readings in Japanese differ from their original Chinese readings; for example, 外人 [gai jin] in Japanese is [wai4ren2] in Chinese. The differences also create many homonyms; for example, "a-ki" can be 秋、空き、飽き、開き、安芸、 and so forth, in Japanese.

At the same time, not all Japanese *kanji* and Chinese characters are the same. Some shared characters are very similar but not exactly the same, for example, the simplified Chinese 爱 [ai4] and *kanji* 愛 [ai]. Others have different appearances; for example, *kanji* 粧 is 妆 in Chinese for Mainland China and 妝 for Taiwan and Hong Kong. Some characters in compound words are reversed, but the meanings are the same; for example, 制限 [sei gen] in Japanese is 限制 [xian4zhi4] in Chinese (restriction, a limit). Other compounds have different meanings in Japanese and Chinese, for example, 丈夫 meaning "strong build of body" in Japanese [joo-bu] but "male spouse" or "male" in Chinese [zhang4fu].

Japanese vocabulary has orthographically four different intraword structures: 1) single *kanji* (a logograph) (e.g. 愛 [ai]: love); 2) *kanji* compound (e.g. 探検 [tan ken]: exploration); 3) *kanji* and kana (e.g. 食べた [tabe-ta]: ate, have eaten; 生ハム[nama - hamu]: raw + ham); and 4) kana alone (e.g. スキー [sukii]: ski). Three categories out of the four require *kanji* characters, and the second category forms more than half of the Japanese vocabulary, comprising two to three character compounds of mostly Chinese origin (kan-go). For example, kan-go comprised 53.6% of entry words in 『例解国語辞典』 edited by Motoki Tokieda in 1956 (Miyajima, 1993).

Morphologically, Japanese vocabulary consists of single morphemes (e.g. single *kanji*: 愛 [ai]: love; スキー [sukii]: ski), and compound morphemes (e.g. 食べた [tabe-ta]: to eat + past/perfect tense (ate; have eaten); 明暗 [mei-an]: light and dark; 探検[tan ken]: (to) search + (to) check (exploration); 短剣 [tan ken]: short＋knife; 無料 [mu ryo]: no + charge). Therefore, morphologically *kanji* has to be learned as words (single *kanji*) and as morphemes of compound words. *Kanji* typically employs kun-reading in the first two categories, but often on-reading for *kanji* compounds.

2.4   Learner belief in kanji learning in JFL

Japanese vocabulary learning appears not to be simple for either CB or NCB learners. Despite the complexity of learning *kanji*, the learners appear to believe that they can learn *kanji* by themselves.

Shimosegawa (1984) found that 10 out of 14 of her NCB learner subjects believed that they could learn *kanji* by themselves (without and with some help). Shimizu's (1994) study found that nearly 60% of her Asian learner subjects (69 Chinese, 27 Korean, and 21 others) believed they could learn *kanji* by themselves. Ishida (1984) asked a mixed group of 11 CB and 39 NCB learners about the difficulty of *kanji* learning. The CB learners stated that the reading of *kanji* was hardest (73%), whereas the NCB learners found reading (41%) and writing (48%) most difficult. Toyoda (1995) surveyed 91 learner subjects who had no knowledge of *kanji* before starting Japanese and found most (92%) believed they could learn *kanji* by themselves and 51% of the subjects stated they could learn by themselves while the other 41% said they could do so with some help.

Toyoda's (1995) subjects, as a whole, believed the top three *kanji* learning difficulties were: 1) easily forgettable, 2) multiple readings, and 3) *kanji* with similar shapes. Toyoda's cohort consisted of three learner levels: 34 beginners (up to 300 character knowledge), 43 intermediate (301-1000 character knowledge) and 14 advanced (1000-2000 character knowledge). Her intermediate level group had the most difficulty with multiple readings and similar shapes, whereas the other two groups felt keeping *kanji* in their memory was most challenging. Toyoda concluded that keeping *kanji* in long term memory appears harder than memorizing them in the short term.

3   Study

The present study examined *kanji* learning performance of CB and NCB learner groups in a JFL course at intermediate to post intermediate level, where the *kanji* knowledge is crucial to succeed in JFL learning (Toyoda, 1995). The course intended to assist the NCB learners by providing them with *kanji* knowledge which is assumed to be already part of the CB learners' L1 knowledge. They also received a short (crash) course of training on how to use that knowledge to learn and remember *kanji*, and time to apply the training for building *kanji* vocabulary.

The immediate purpose of the study is to explore and understand the different performance of the CB and the NCB learners of intermediate level:

1. How their previous character (L1) knowledge and practice prepared the CB learners better for *kanji* learning, compared to the NCB learners before the course:
   Hypothesis 1: the CB learner group will outperform the NCB learner group
   Hypothesis 2: the gap might be smaller for reading
2. How the groups actually differed in performance at the end of the course:
   Hypothesis 3: the NCB learner group will improve more than the CB group
   Hypothesis 4: the performance gap between CB and NCB for reading might be narrower, and
3. How the instruction possibly affected the two groups differently.

It appears that CB learners' L1 character knowledge is an obvious, tangible advantage in Japanese *kanji* learning. Therefore it is expected that CB learners will outperform NCB learners. CB learners certainly can identify *kanji* faster than NCB learners due to their familiarity with characters (simultaneous whole character and intraword morpheme retrieval processes).

However, CB learners may have some hindrances due to their L1 knowledge of characters in a different language system. CB learners may not be able to read (pronounce) *kanji* words correctly, due to different pronunciations of *kanji* from Chinese. Japanese compound morpheme words consist of not only characters but also *kanji* and *hiragana* combinations. Many of the latter (verbs and adjectives) also conjugate like English verbs (concatenative), unlike Chinese (non-concatenative). Some *kanji* characters also differ in appearance from their Chinese counterparts.

Lack of a character system in their L1 (zero contrast) makes NCB learners' *kanji* learning harder. Providing 1) *kanji* word knowledge and practice throughout the course and 2) structured self-learning time (*kanji* project) should assist them to improve their *kanji* learning. The assistance given to the NCB learners can also help the CB learners' *kanji* learning.

3.1   Method

3.1.1   Participants and course

The participants in this study were 20 character based L1 background learners (CB: 3 male and 17 female Chinese speakers) and 47 non-character based L1 background learners (NCB: 15 male and 32 female English speakers) who were taking an intermediate level Japanese course (Level 5) at an Australian University. The length of their Japanese language learning at school varied from 1 to 14.3 years and the cohort average was 5.58 years. The average length for the CB group was 3.47 years and for the NCB group 6.49 years. In addition, some had learned Japanese by themselves outside of school and had spent time in Japan. Therefore, even though they were all at intermediate level, their Japanese language experience varied and thus, their *kanji* learning experience was not the same before the course commenced.

The course ran for 12 weeks. Through the course both groups received the same instruction. It consisted of one hour lecture and 1.5 hour tutorial per week. The course provided basic linguistic knowledge of *kanji* in the lecture. The content of the lecture provided 1) the NCB learners with the linguistic knowledge of characters which the CB learners had acquired in their L1, and 2) both learner groups with *kanji* specific knowledge. Each week, the lecture and tutorial had a different focus, and *kanji* specific knowledge included orthographical and morphological intraword structures of *kanji* words, and phonological information about *kanji*: on-reading (*kan-go*) and kun-reading (*wa-go*), and homophones. In tutorials both learner groups did exercises on how to apply the lecture content to learn *kanji*. The worksheets used in tutorials were a mixture of lecture materials and pages from Basic *Kanji* Books (Kano, Shimizu, Takenaka, & Ishii, 1989), and others.

Along with attending the lectures and tutorials, the learners conducted an independent *kanji* project, with the ultimate goal of learning all "*kanji* on the list." These *kanji* characters included a) previously-taught *kanji* (target *kanji* in Levels 1 to 4: 376 single characters) and b) target *kanji* for Levels 5 and 6 (not yet formally taught: 147 single characters). Due to individual differences, such as CB or NCB background, the extent of *kanji* learning before taking this course, students were instructed to determine their own specific goals. Some students decided that their goals were less than learning all "*kanji* on the list" and some set more ambitious goals.

The project also aimed to improve their *kanji* learning and vocabulary building. They were expected to ascertain best personal methods for remembering *kanji* as well as utilising the strategies they learned in class. The project followed the steps of: 1) introduction; 2) setting objectives (Weeks 1~2); 3) making plan (Weeks 1~4); 4) keeping records on their own *kanji* project (Weeks 1~11); 5) completing project and reflecting on their achievement (Week 11); 6) discussing and sharing their experiences with the project.

3.1.2   The tests

The pre-course *kanji* test given at the beginning consisted of two parts: A and B (50 questions each), each of which was divided into reading and writing *kanji* sections (25 questions each). In Part A *kanji* compound or *kanji*-kana, words were chosen randomly from the 376 *kanji* taught in Levels 1 to 4. The words tested in Part B were selected in the same manner from the 147 not-yet-taught *kanji* for Levels 5 and 6 (refer to 3.1). All *kanji* words were tested in sentences (not as stand-alone single words) in the test (refer to Appendix 1 for sample questions).

The post-course test consisted of two parts: Parts A and B. Part A tested *kanji* compound or *kanji*-kana word reading and writing in the same manner as the pre-course test. The 40 *kanji* compound or *kanji*-kana words in Part A were chosen randomly from the total *kanji* list (376 + 147 single characters). Part B involved 12 different questions (B-1 to 12). They included eight questions testing the use of *kanji* word knowledge provided in lectures and practised in tutorials.

They were:

B-2:   Provide *kanji* or *kanji* words for the given pronunciations: e.g. [a-ki]: 秋，空き，飽き

B-3:   Read (provide the pronunciations) of the given *wa-go* in sentences:
         e.g.   始める [haji-meru] (cf. 初めて[haji-mete])
B-4:   Write *kan-go* words into *wa-go* expressions conveying the same meanings:
         e.g.   開店（店を開ける）
B-5:   Match *kanji* compound words (adjectives) with given meanings:
         e.g. 複雑な（かんたんではない、こみいった）
B-8:   Find *kanji* of opposite meaning: e.g. 上 ↔ ｛中　・　下　・　右　・　左｝
B-9:   Find a common a) orthographical, b) morphological, c) phonological, d) semantic, or e) grammatical feature in a group of *kanji*: e.g. {日・田・月・木・金}: days of the week
B-10:   Choose *kanji* or *kanji* words to match the given prefix: e.g. 不（明）
B-11:   Group given *kanji* so that *kanji* in the group share a common feature:
         e.g.（赤）（青）（黒）（白）: representing colours

4 Results

4.1 *Analysis of subject performance on pre-course test*

The pre-test was given to the participants in class and they did it in their own time; however, no one took more than 40 minutes. Each part of the test was marked by giving one mark for correct answers only. Two markers scored the test and any discrepancy in the two markings was corrected by discussion between the two markers. The internal consistency of the four test sections: taught *kanji* reading (shown as A-read in Table 1), taught *kanji* writing (A-write), not-yet-taught *kanji* reading (B-read), and not-yet-taught *kanji* writing (B-write), was high (Cronbach's α = .889).

Table 1. Pre-course Kanji test results

CB/NCB Groups		A read	A write	B read	B write
NCB	Mean	13.81	8.68	3.51	.87
	N	47	47	47	47
	Std. Deviation	3.982	4.611	4.491	1.974
CB	Mean	16.90	15.40	10.60	7.60
	N	20	20	20	20
	Std. Deviation	4.756	3.803	5.394	5.960
Total	Mean	14.73	10.69	5.63	2.88
	N	67	67	67	67
	Std. Deviation	4.426	5.346	5.755	4.750

Table 1 shows the summary of the cohort/group scores for correctly remembered *kanji* reading and writing. Figure 1 shows that both groups' correctly read or written *kanji* scores declined from reading of previously introduced *kanji*, to writing of those *kanji*, then to reading of not yet introduced *kanji*, and to writing of those *kanji*.
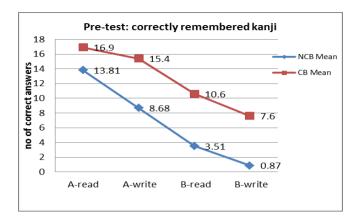
Fig. 1. Correctly remembered *kanji* in pre-course test

As a cohort, their performance correlated strongly within Part B (between not-yet-taught reading and writing): $r = .803$**, and within Part A (between taught reading and writing): $r = .733$** (Table 2). The cohort also demonstrated correlation $(r = .712$** as in Table 2) between taught and not-yet-taught *kanji* writing.

Table 2. Correlations between cohort performance for each section

		A write	B read	B write
A read	Pearson Correlation	**.733****	.588**	.486**
	Sig. (2-tailed)	.000	.000	.000
	N	67	67	67
A write	Pearson Correlation		.690**	**.712****
	Sig. (2-tailed)		.000	**.000**
	N		67	**67**
B read	Pearson Correlation			**.803****
	Sig. (2-tailed)			.000
	N			67

** Correlation is significant at the 0.001 level (2 tailed).

Table 3. Correlations between NCB group performance for each section

		A write	B read	B write
A read	Correlation Coefficient	**.770****	.454**	.575**
	Sig. (2-tailed)	.000	.001	.000
	N	47	47	47
A write	Correlation Coefficient		.486**	.621**
	Sig. (2-tailed)		.001	.000
	N		47	47
B read	Correlation Coefficie nt			**.839****
	Sig. (2-tailed)			.000
	N			47

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

Table 4. Correlations between CB group performance for each section

		A write	B read	B write
A read	Pearson Correlation	.590**	**.632****	.323
	Sig. (2-tailed)	.006	**.003**	.162
	N	20	**20**	20
A write	Pearson Correlation		.693**	**.692****
	Sig. (2-tailed)		.001	**.001**
	N		20	**20**
B read	Pearson Correlation			.715**
	Sig. (2-tailed)			.000
	N			20

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

A comparison between CB and NCB learner groups' performance for each section revealed the following differences:

1. Both groups showed strongest correlation in Part B, between not-yet-taught *kanji* reading and writing (CB: $r = .715^{**}$; NCB: $r = .839^{**}$ as in Tables 3 and 4).
2. The NCB learner group also showed strong correlation in Part A (between taught reading and writing): $r = .770^{**}$ (Table 3). In addition, the group demonstrated reasonable correlation ($r = .621^{**}$) between taught and not-yet-taught *kanji* writing (Table 3).
3. The CB learner group also showed reasonable correlation between reading for taught (Part A) and not-yet-taught *kanji* (Part B): $r = .632^{**}$ and writing for taught (Part A) and not-yet-taught *kanji* (Part B): $r = .692^{**}$ (Table 4). Interestingly, they showed more correlation between taught *kanji* writing (Part A) and not-yet-taught *kanji* reading ($r = .693^{**}$ as in Table 4).

Table 5 shows the CB and NCB learner groups' performance overlap for each section. The two groups' answers had the most overlap in reading taught *kanji* ($r^2 = 64.5$, Part A reading), then writing taught *kanji*, not-yet-introduced *kanji* reading, and the least overlap in writing not-yet-introduced *kanji* ($r^2 = 25.3$, Part B writing).

Table 5. Overlap between CB and NCB performance in pre-course kanji test

NCB vs CB scores	Part A reading	Part A writing	Part B reading	Part B writing
Pearson Correlation	.803**	.608**	.529**	.503*
Sig. (2-tailed)	.000	.001	.006	.010
N	25	25	25	25

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

Even for reading of taught *kanji* (A-read in Figure 1 and Table 1), where NCB learner group achieved 81.7% of what CB group did and sharing 64.5% answers (Table 5), ANOVA test showed the difference between NCB and CB learner groups (Table 6).

Table 6. Comparison of correct answers between CB and NCB in pre-course test

Part	df	F	Sig.
A-Reading between CB and NCB	1	7.520	.008
A-Writing between CB and NCB	1	32.858	.000
B-Reading between CB and NCB	1	30.957	.000
B-Writing between CB and NCB	1	48.330	.000

4.2 Subject performance in post-course test

The post-course test consisted of Parts A and B (refer to 3.1.2). Part A tested kanji compounds or kanji-kana word reading and writing in the same manner as the pre-course test. The 40 kanji compound or kanji-kana words in Part A were chosen randomly from the total kanji list (376 + 147 single characters).

Part B contained 8 questions testing kanji words, and to answer them, the learners required knowledge introduced and practised through the previous twelve weeks (B-2, 3, 4, 5, 8, 9, and 10, refer to 3.1.2). The internal consistency of Parts A and B scores was high (Cronbach's α = .872), and was reasonable (Cronbach's α = .822) in Part B considering there was only 5 to 15 items in each sub-component.

Table 7. Comparison of participants' correct answers in Post-course test

Post-course test Part B		Total	B-2 (10)	B-3 (5)	B-4 (5)	B-5 (10)	B-8 (5)	B-9 (5)	B-10 (10)	B-11 (10)
NCB Group	Mean	32.38	6.57	2.30	2.52	**3.55**	3.68	2.69	**4.83**	6.26
	N	47	47	47	47	**47**	47	47	**47**	47
	Std. Div	10.689	1.942	1.743	1.429	**2.888**	.935	1.502	**2.334**	3.429
CB Group	Mean	49.20	8.15	3.60	3.35	**8.75**	4.40	4.00	**8.65**	8.25
	N	20	20	20	20	**20**	20	20	**20**	20
	Std. Div	7.571	2.110	1.501	1.424	**1.943**	.681	.649	**1.387**	2.712
Co-hort	Mean	37.40	7.04	2.69	2.77	**5.10**	3.90	3.08	**5.97**	6.85
	N	67	67	67	67	**67**	67	67	**67**	67
	Std. Div	12.500	2.107	1.768	1.468	**3.555**	.923	1.434	**2.730**	3.341

Table 8. CB and NCB learner groups' score comparison for Part B in the post-course test

		Whole cohort (67)	CB group (20)	NCB group (47)
Part A (out of 40)	Mean	25.62 (64.1%)	31.45 (78.6%)	23.14 (57.9%)
	Std Dev	8.20	6.68	7.55
Part B (out of 60)	Mean	37.40 (62.3%)	49.20 (82.0)	32.38 (54.0%)
	Std Dev	12.50	7.57	10.68

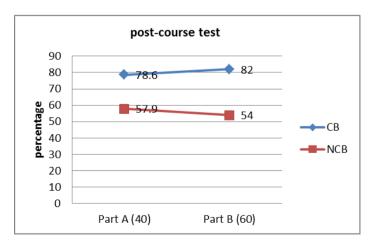N.B. > One NCB learner missed the final examination.

Fig. 2. Post-course test CB and NCB performance comparison (percentage)

As seen in Table 7, the whole cohort did slightly better with straight *kanji* reading and writing (Part A: 64.2%) than with *kanji* word knowledge questions (Part B: 62.3%). The CB learner group outperformed the NCB learner group in both Parts A and B (Table 7; Fig. 2). Interestingly, the CB learner group performed better on Part B (82.0%) than Part A (78.6%), whereas the NCB learner group was better on Part A (57.9%) than Part B (54.0%, Fig. 2).

The comparison of the two groups' performance in Part B sub-components (kanji word knowledge, Table 8) showed:
1. Both groups did reasonably well on the questions asking them to provide homophonic kanji words for the given pronunciations (B-2) and to find kanji of opposite meaning to the given kanji (B-8).
2. The CB learner group outperformed the NCB learner group considerably on the questions asking them to match kanji compound words (adjectives) with given meanings (B-5) and to use prefix kanji properly (B-10).

ANOVA test (Table 9) shows again, the CB and NCB learner groups differ regarding *kanji* knowledge and performance. Their scores for Part A had a rather large gap (CB: 78.7%; NCB: 57.6%, Table 7) and their scores for each sub-component varied (Table 8). Nevertheless, their group performance in the post-course test showed a reasonable overlap for both parts: 50% (r = .704**) for Part A and 63.8% (r = .799**) for Part B. Since the participant numbers were not even between the two groups (CB = 20 and NCB = 47), within-subjects contrast was used to test the outcomes above. The results indicated that the difference in the participant numbers did not affect the previous outcomes in this study (F = .860, Sig. = .357).

Table 9. Comparison of correct answers between CB and NCB in Post-course test

Part	df	F	Sig.
Part A Kanji reading and writing test CB and NCB	1	18.350	.000
Part B Kanji word knowledge test CB and NCB	1	40.349	.000

4.3   Differences in CB and NCB background learners in the pre- and post-course tests

Lastly, the participants' *kanji* performances in the pre- and post-course tests were compared. The internal consistency of the three parts (Pre-course *kanji* test, Part A and Part B of Post-course test) of the two tests was reasonable (Cronbach's α = .839). As Figure 3 shows, both groups improved clearly in the post-course test, increasing their scores by 28.1% (CB: from 50.5% to 78.63%) and by 30.1% (NCB: 26.78% to 57.85%). The CB learner group did not display any discrepancy between their straight *kanji* reading and writing scores (78.63%, Part A) and scores for application of *kanji* knowledge (78.67%, Part B), whereas the NCB learner group scored slightly less for the taught *kanji* knowledge (Part B).

Finally, relationships among scores for Pre-test, Part A in post-test (straight *kanji* reading and writing), and Part B in post-test (*kanji* word knowledge) were explored (Table 10).
1. The cohort performance correlated well (r = .841**) between Parts A and B, but less so between the pre-test and Part A (r = .641**), and the pre-test and Part B (r = .604**). One sub-component of Part B, B-5, "Match *kanji* compound words (adjectives) with given meanings," also correlated to Pre-test (r = .630**) reasonably strongly.
2. *Kanji* reading and writing performance in Part A also correlated well to B sub-components, B-2 (r = .788**), "Provide *kanji* words for the given pronunciations," and B-5 (r = .715**), "Match *kanji* compound words (adjectives) with given meanings."
3. Over all *Kanji* knowledge performance in Part B correlated strongly to the following sub-components: B-5 (r = .865**) and B-10 (r = .815**), "Choose *kanji* or *kanji* words to

match the given prefix," then to B-9 ($r = .726$**), "Find a common a) orthographical, b) morphological, c) phonological, d) semantic, or e) grammatical feature in a group of *kanji*," and B-3 ($r = .703$**), "Provide pronunciations of the given *wa-go*."

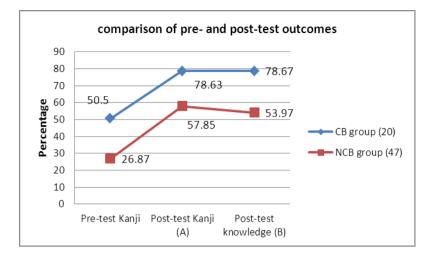**Fig. 3. Pre-test and post-test comparisons between CB and NCB learner groups**

Table 10. Cohort Part A and Part B performance

		Pe-test	Post-A	Post B	B_2	B_3	B_4	B_5	B_8	B_9	B_10
Post (A)	Correlation	.641**									
	Sig. (2-tailed)	.000									
	N	67									
Post (B) Total	Correlation	.604**	.841**								
	Sig. (2-tailed)	.000	.000								
	N	67	67								
B_2	Correlation	.389**	.788**	.672**							
	Sig. (2-tailed)	.001	.000	.000							
	N	67	67	67							
B_3	Correlation	.361**	.579**	.703**	.426**						
	Sig. (2-tailed)	.003	.000	.000	.000						
	N	67	67	67	67						
B_4	Correlation	.378**	.515**	.670**	.393**	.562**					
	Sig. (2-tailed)	.002	.000	.000	.001	.000					
	N	67	67	67	67	67					
B_5	Correlation	.630**	.715**	.865**	.505**	.563**	.630**				
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000				
	N	67	67	67	67	67	67				
B_8	Correlation	.264*	.442**	.543**	.286*	.308*	.403**	.493**			
	Sig. (2-tailed)	.031	.000	.000	.019	.011	.001	.000			
	N	67	67	67	67	67	67	67			
B_9	Correlation	.467**	.689**	.726**	.670**	.417**	.351**	.504**	.426**		
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.004	.000	.000		
	N	67	67	67	67	67	67	67	67		
B_10	Correlation	.388**	.550**	.815**	.454**	.486**	.408**	.736**	.359**	.607**	
	Sig. (2-tailed)	.001	.000	.000	.000	.000	.001	.000	.003	.000	
	N	67	67	67	67	67	67	67	67	67	
B_11	Correlation	.408**	.506**	.619**	.227	.339**	.268*	.338**	.243*	.354**	.378**
	Sig. (2-tailed)	.001	.000	.000	.065	.005	.028	.005	.047	.003	.002
	N	67	67	67	67	67	67	67	67	67	67

The NCB learner group showed shared correlations with the whole cohort (Table 11).

1. The NCB learner group showed similar but weaker correlation between Parts A and B (r = .683**) as the cohort, and similarly with pre-test (Part A: r = .531**; Part B: r = .511**).
2. *Kanji* reading and writing performance also correlated reasonably to B sub-components, B-2 (r = .655**), "Provide *kanji* words for the given pronunciations" and B-9 (r = .642**), "Find a common a) orthographical, b) morphological, c) phonological, d) semantic, or e) grammatical feature in a group of *kanji*."
3. Over all *kanji* knowledge performance correlated well to its sub-components B-5 (r = .783**), "Match *kanji* compound words (adjectives) with given meanings" and B-10 (r = .730**), "Choose *kanji* or *kanji* words to match the given prefix." However, it also correlated reasonably and significantly (r = .604** ~ r = .692**) to most of the sub-components except B-8 (r = .458**), "Find *kanji* of opposite meaning."

Table 11. NCB Part A and Part B performance

		Pre-test	Post (A)	Post (B)	B_2	B_3	B_4	B_5	B_8	B_9	B_10
Post (A)	Correlation	.531**									
	Sig. (2-tailed)	.000									
	N	47									
Post (B) Total	Correlation	.511**	.683**								
	Sig. (2-tailed)	.000	.000								
	N	47	47								
B_2	Correlation	.363*	.655**	.608**							
	Sig. (2-tailed)	.012	.000	.000							
	N	47	47	47							
B_3	Correlation	.315*	.400**	.692**	.295*						
	Sig. (2-tailed)	.031	.005	.000	.044						
	N	47	47	47	47						
B_4	Correlation	.230	.508**	.646**	.336*	.553**					
	Sig. (2-tailed)	.119	.000	.000	.021	.000					
	N	47	47	47	47	47					
B_5	Correlation	.464**	.505**	.783**	.396**	.561**	.614**				
	Sig. (2-tailed)	.001	.000	.000	.006	.000	.000				
	N	47	47	47	47	47	47				
B_8	Correlation	.091	.370*	.458**	.263	.301*	.395**	.381**			
	Sig. (2-tailed)	.543	.011	.001	.074	.040	.006	.008			
	N	47	47	47	47	47	47	47			
B_9	Correlation	.381**	.642**	.694**	.685**	.377**	.288*	.330*	.360*		
	Sig. (2-tailed)	.008	.000	.000	.000	.009	.050	.024	.013		
	N	47	47	47	47	47	47	47	47		
B_10	Correlation	.252	.243	.730**	.283	.445**	.317*	.556**	.194	.518**	
	Sig. (2-tailed)	.087	.100	.000	.054	.002	.030	.000	.192	.000	
	N	47	47	47	47	47	47	47	47	47	
B_11	Correlation	.396**	.399**	.604**	.170	.254	.185	.230	.096	.329*	.350*
	Sig. (2-tailed)	.006	.005	.000	.254	.085	.213	.120	.520	.024	.016
	N	47	47	47	47	47	47	47	47	47	47

The CB learner group showed different correlations from the NCB group or the cohort (Table 12):

1) The performance in Part A correlated less to Part B (r = .785**) than to B-2 (r = .829**), "Provide *kanji* words for the given pronunciations."

2) *Kanji* reading and writing performance correlated strongly to B-2 (r = .829**, see above) and much less to B-5 (r = .641**), "Match *kanji* compound words (adjectives)."

3) *Kanji* knowledge performance correlated well to B-4 (r = .771**), "Write *kan-go* words in-to *wa-go* expressions." The performance also correlated reasonably strongly to B-5 (r = .718**), "Match *kanji* compound words (adjectives) with given meanings" and B-2 (r = .709**), "Provide *kanji* words for the given pronunciations."

Table 12. CB Part A and Part B performance

		Pre-test	Post (A)	Post (B)	B-2	B-3	B-4	B-5	B-8	B-9	B-10
Post (A)	Correlation	.468*									
	Sig. (2-tailed)	.037									
	N	20									
Post (B) Total	Correlation	.392	.785**								
	Sig. (2-tailed)	.088	.000								
	N	20	20								
B_2	Correlation	.137	.829**	.708**							
	Sig. (2-tailed)	.565	.000	.000							
	N	20	20	20							
B_3	Correlation	.130	.454*	.613**	.494*						
	Sig. (2-tailed)	.585	.045	.004	.027						
	N	20	20	20	20						
B_4	Correlation	.417	.428	.771**	.323	.439					
	Sig. (2-tailed)	.067	.059	.000	.165	.053					
	N	20	20	20	20	20					
B_5	Correlation	.634**	.641**	.718**	.408	.204	.731**				
	Sig. (2-tailed)	.003	.002	.000	.074	.389	.000				
	N	20	20	20	20	20	20				
B_8	Correlation	.200	.055	.342	-.044	-.100	.186	.279			
	Sig. (2-tailed)	.397	.818	.140	.854	.675	.434	.234			
	N	20	20	20	20	20	20	20			
B_9	Correlation	.313	.318	.378	.471*	.076	.255	.290	.096		
	Sig. (2-tailed)	.179	.172	.101	.036	.749	.277	.215	.687		
	N	20	20	20	20	20	20	20	20		
B_10	Correlation	-.193	.323	.486*	.505*	.095	.367	.395	.100	.165	
	Sig. (2-tailed)	.414	.165	.030	.023	.690	.111	.084	.674	.486	
	N	20	20	20	20	20	20	20	20	20	
B_11	Correlation	.199	.332	.524*	.072	.330	.282	.104	.420	-.082	-.160
	Sig. (2-tailed)	.401	.152	.018	.761	.155	.228	.662	.065	.732	.500
	N	20	20	20	20	20	20	20	20	20	20

5 Discussion

In this classroom based research, CB and NCB learners' performance in two tests during an intermediate level JFL course was explored to understand each learner group's *kanji* learning. The first test was given at the beginning of the course as a pre-test, and then both groups were given the same lessons which included lectures to provide *kanji* word knowledge and tutorials to practise how to apply the knowledge to learning *kanji*. After the course, the second test was given as a post-test.

As expected (Hypothesis 1), the CB group outperformed the NCB group overall (Table 1) in the pre-test, and the two groups were statistically significantly different from each other (Table 6). The overall gaps between the two groups certainly suggest positive L1 transfer for the CB group. The gaps between the groups in taught *kanji* reading and writing (Part A) suggest the effects of *zero contrast* (Zobl, 1982) on the NCB learners, and thus they require more steps and time to learn *kanji*.

Even though JFL learners claimed that they can learn *kanji* themselves (refer to 2.4), the considerable discrepancy in scores for taught and not-yet-taught *kanji* (Part A vs Part B) suggests that *kanji* introduction (teaching) in class had an effect on JFL learners' *kanji* learning.

As assumed (Hypothesis 2), there was a much smaller gap in scores between the CB and NCB learner groups for reading of taught *kanji* (CB: 16.90, NCB: 13.81 as in Table 1), and 64.5% of their answers overlapped (Table 6). Since CB learners are more morphologically oriented (L1: Chinese), they can recognise *kanji* by sight easily. However, when the CB learners recognise *kanji* words, the characters are already assigned to L1 sounds and meanings (Zobl, 1982, 1983). Thus, they need to re-assign the Japanese reading and meanings to those characters to pronounce them correctly as *kanji*. Some compounds such as 制限 or some readings like 外 [soto, hoka] (refer to 2.3) may require repetitive practice by CB learners. On the other hand, NCB learners are more phonologically oriented, and due to previously insufficient character training (*zero contrast* in L1), they rely more on phonological access (pronunciation) than morphological access to *kanji* to understand and remember *kanji* words for recognition and reproduction.

The NCB group had a low average score for not-yet-taught *kanji*: B-reading 14.0% (3.51 out of 25) and B-writing 3.5% (0.87 out of 25). This strongly indicated that NCB learners had little idea about reading and almost no idea about how to write *kanji* which had not been introduced to them in class. In other words, their overall previous knowledge of *kanji* was unable to provide clues to read or write not-yet-taught *kanji*. On the other hand, the CB learners could work out not-yet-taught *kanji* to a much greater extent: B-reading: 40.0% and writing: 26.6 %, thanks to their knowledge of and experience with *kanji*.

Correlations between each group's scores for each section provided some insight into each learner group's *kanji* proficiency before the course. The NCB learners showed when they could read *kanji* well, they tended to write well or vice versa, regardless of whether the *kanji* were taught or not ($r =.770**$ and $r =.839**$ respectively as in Table 4). Thus the NCB learners appear to be trying to develop morphological and phonological access to *kanji* in tandem. Considering this with the wide gaps between their scores for taught and not-yet-taught *kanji* (Table 1), *kanji* instruction in class appears crucial for this group to develop both reading and writing *kanji*.

On the other hand, the CB learners showed that when they could read taught *kanji* well, they also tended to read not-yet-taught *kanji* well, and the same applied for writing *kanji* (Table5). More interestingly, their reading and writing of taught *kanji* had weaker correlation ($r =.590**$) than those between reading ($r =.632**$) and writing ($r =.692**$) across taught and not yet taught *kanji*. This suggests that CB learners were working from some hypotheses about how to translate Chinese characters to Japanese *kanji*, and Chinese sounds to Japanese sounds (Schachter, 1983).

The second question was how each group actually differed from the other in *kanji* performance after the course. As expected (Hypothesis 3), the NCB learner group improved noticably (Pre-test: 26.87% to Post-test (A): 57.85%) for *kanji* reading and writing, and narrowed the gap with the CB learner group (Hypothesis 4) slightly (Pre-test: 23.6% to Post-test: 20.78%). However, the CB learner group also improved at a similar rate (Pre-test: 50.5% to Post-test: 78.63%), and outperformed the NCB learner group on both occasions. From the equally large improvement, it is assumed the course content: *kanji* knowledge, a short (crash) course of training in how to use the knowledge, and time to apply the training for their own *kanji* vocabulary building, helped both learner groups.

When their scores for *kanji* reading and writing and for *kanji* word knowledge in the post-test were compared, the CB learner group did not display any discrepancy between reading and writing

(78.63% in Part A) and knowledge (78.67% in Part B), whereas the NCB learner group scored slightly less for *kanji* knowledge (57.9% in Part A; 54.0% in Part B).

The gap between the scores for *kanji* reading and writing performance (Part A) and for *kanji* knowledge (Part B) may suggest some strategy use by the NCB learners. The NCB learners might be using other than systematic applications of their *kanji* word knowledge (such as contexts where those *kanji* appeared) to learn and remember *kanji*. The CB learner group outperformed the NCB learner group for all sub-components in Part B of the post-test. However, the two groups were reasonably close for the two sub-components: "Provide homonymic *kanji* words for the given pronunciations" (B-2) and "Find *kanji* of opposite meaning to the given *kanji*" (B-8), where it appears their L1 experience assisted the NCB learners and made it harder for the CB learners to remember some *kanji* and *kanji* words.

Being phonologically more aware, the NCB (English) learners were potentially more sensitive to the reading of *kanji* (B-2) whereas being morphologically more aware, the CB learners might have had difficulty assigning different Japanese sounds to the same *kanji*. The CB learners strongly outperformed the NCB learners on the sub-components testing intraword, morphological and/or whole character knowledge, such as (B-5) to match meaning and *kanji* compound words, and (B-10) to use prefix *kanji* properly.

The cohort *kanji* knowledge scores appear to represent how well they could match *kanji* compounds and their meanings (B-5), could use prefix *kanji* properly (B-10), were aware of common a) orthographical, b) morphological, c) phonological, d) semantic, or e) grammatical features in *kanji* words (B-9) and could read wa-go (Japanese specific *kanji* words) (B-3). The cohort *kanji* knowledge scores correlated well ($r = .841**$) to *kanji* reading and writing performance. In particular, their ability to use both phonological and morphological access: (B-2: to provide homonymic *kanji* words for the given pronunciations), and ability to use whole character and/or intraword morphological knowledge to recognise words: (B-5: to match meaning and *kanji* compound words) correlated to their *kanji* reading and writing performance.

The NCB learners' group *kanji* knowledge scores appear to represent how well they could match *kanji* compounds and their meanings (B-5) and could use prefix *kanji* properly (B-10), and to a less extent the sub-components (B-3), (B-9), and so forth (refer to Table 11). Their *kanji* knowledge scores correlated reasonably ($r = .683**$) to *kanji* reading and writing performance. In particular, their ability to use both phonological and morphological access: (B-2), and their awareness of a) orthographical, b) morphological, c) phonological, d) semantic, or e) grammatical features in *kanji* words (B-9) correlated to their *kanji* reading and writing performance.

The CB learners' group *kanji* knowledge scores appear to represent how well they could translate kan-go into wa-go expressions (B-4) and could match *kanji* compound words and their meanings (B-5). Their *kanji* knowledge performance correlated well ($r = .785**$) to *kanji* reading and writing performance. In particular, their ability to use both phonological and morphological access: (B-2), and to match meaning and *kanji* compound words (B-5) correlated to their *kanji* reading and writing performance.

The above contrasts between the CB and NCB learner groups in their post-test performance can be summed up as follows.

Their development of morphological and logographic access to *kanji*, "Match *kanji* compounds and their meanings" (B-5) and "Use prefix *kanji* properly" (B-10) can be a good indicator of how well the NCB learners have advanced in *kanji* learning. At this stage, the NCB learners were using both phonological and morphological access to learn *kanji* (B-2) reasonably well and were aware of orthographical, morphological, phonological, semantic, and grammatical features in *kanji* (B-9). However, they were still far behind the CB learners with their morphological and logographic access to *kanji* (Table 10).

Unlike the NCB learners, the CB learners can transfer their already developed morphological and logographic access to *kanji* (B-5). Thus, how they translate kan-go into wa-go (B-4) appears to be a good indicator of how well the CB learners have advanced in *kanji* learning. At this stage, the CB learners were using phonological access (in Japanese) as well as morphological access to learn

kanji (B-2) and placing compound words (in Chinese) into Japanese (*kanji*) by interpreting the words (B-5), and they were doing so reasonably well (Table 10).

The last question was how the course instruction possibly affected the two groups differently. The author had expected that the NCB learner group would receive more benefit from the course instruction since CB learners could have already possessed their skills to use non-linear, ideographic and semantic-phonetic (radical) composition to form and decode *kanji* (refer to 2.2). However, the results in this study showed that both groups benefited from the course (i.e. *kanji* knowledge, practice of how to use the knowledge to learn *kanji*, and self-learning by project) at a similar rate, as far as the test results were concerned.

Pre-test results suggested that the NCB learners were trying to access *kanji* both phonologically and morphologically. However, insufficient *kanji* knowledge and experience prevented them from performing as well as the CB learners. The NCB learners had very little chance to read and write not-yet-taught *kanji*. The CB learners, on the other hand, having morphological access to *kanji* already, seemed to favour a strategy of translating Chinese characters to *kanji*.

Post-test results indicated that development of morphological and logographic access to *kanji* could be a good indicator for the NCB learners' *kanji* learning. They were using morphological and logographic knowledge to access to *kanji*, but much less effectively than the CB learners in the same cohort. The CB learners demonstrated in the post-test that they were working between Chinese characters and *kanji* to learn *kanji*.

After hearing the learners' presentations of their independent *kanji* projects, the author noticed that the NCB learner group's most common comments and reflections were on the effectiveness of their *kanji* learning strategies in terms of time and effort. On the other hand, the CB learner group mostly commented that they paid closer attention to how *kanji* differ from Chinese characters in terms of shape and readings.

To sum up, the course seemed to assist the two groups differently. The instruction worked well for the NCB learners to improve their *kanji* learning by providing knowledge of *kanji* and how to use them, so that they could develop strategies to build their *kanji* vocabulary on their own through the project. The same instruction appeared to clarify for CB learners the differences between Chinse characters and *kanji*, and consequently raised their awareness of *kanji* specific logographic (and morphological) and phonological features.

6   Conclusion

This study examined different performance of *kanji* learning by CB and NCB learners of Japanese. Thus, the same classroom instruction can work differently for each learner group at the same level of Japanese. However, the *kanji* that each group could read and write overlapped in each test. Therefore, it is assumed there is a common progression of *kanji* development as well. For further study, an analysis into the *kanji* both groups could read and write and their errors can elucidate the different developmental paths by CB and NCB learners.

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Appendix 1

Instruction for Pre-test

Part A includes kanji taught at Levels 1 - 4 and VCE. Part B consists of new kanji from Levels 5 & 6.

Start from Part A (reading) and, then Part A (writing). After you have finished Part A, please try Part B as well. Do not panic even if you cannot answer any kanji in Part B. You will learn those kanji through this semester.

<How to write answers>
For reading section: provide reading of each underlined kanji part (or word including kanji or kanji compound) in parentheses. You do not write reading of kanji which is not underlined.
For writing section: provide kanji (ore word including kanji or kanji compound) for the underlined part s of the sentences in parentheses.

<Sample questions in the Pre-test>
Reading
1. 急[1]に友達がイギリスに行くことになって悲しい[2]。
            (   )[1]   (   )[2]

2. 会社の組織[3]。
            (   )[3]

Writing
1. どようび[4]はじゅぎょう[5]がない。
            (   )[4]   (   )[5]

2. このとけいは３０びょう[6]、すすんでいる[7]。
            (   )[6]   (   )[7]

Instruction for Post-test

PART A
Provide reading (pronunciation) of the underlined kanji and write kanji for underlined hiranaga parts. Some parts of hiragana might stay as they are such as おおきい as 大きい.

1. 統計[1]をつかって[2]、説明[3]する。
            (   )[1] (   )[2] (   )[3]

2. 父はふるい[4]えいご[5]の本をもらってよろこんだ[6]。
            (   )[4] (   )[5] (   )[6]